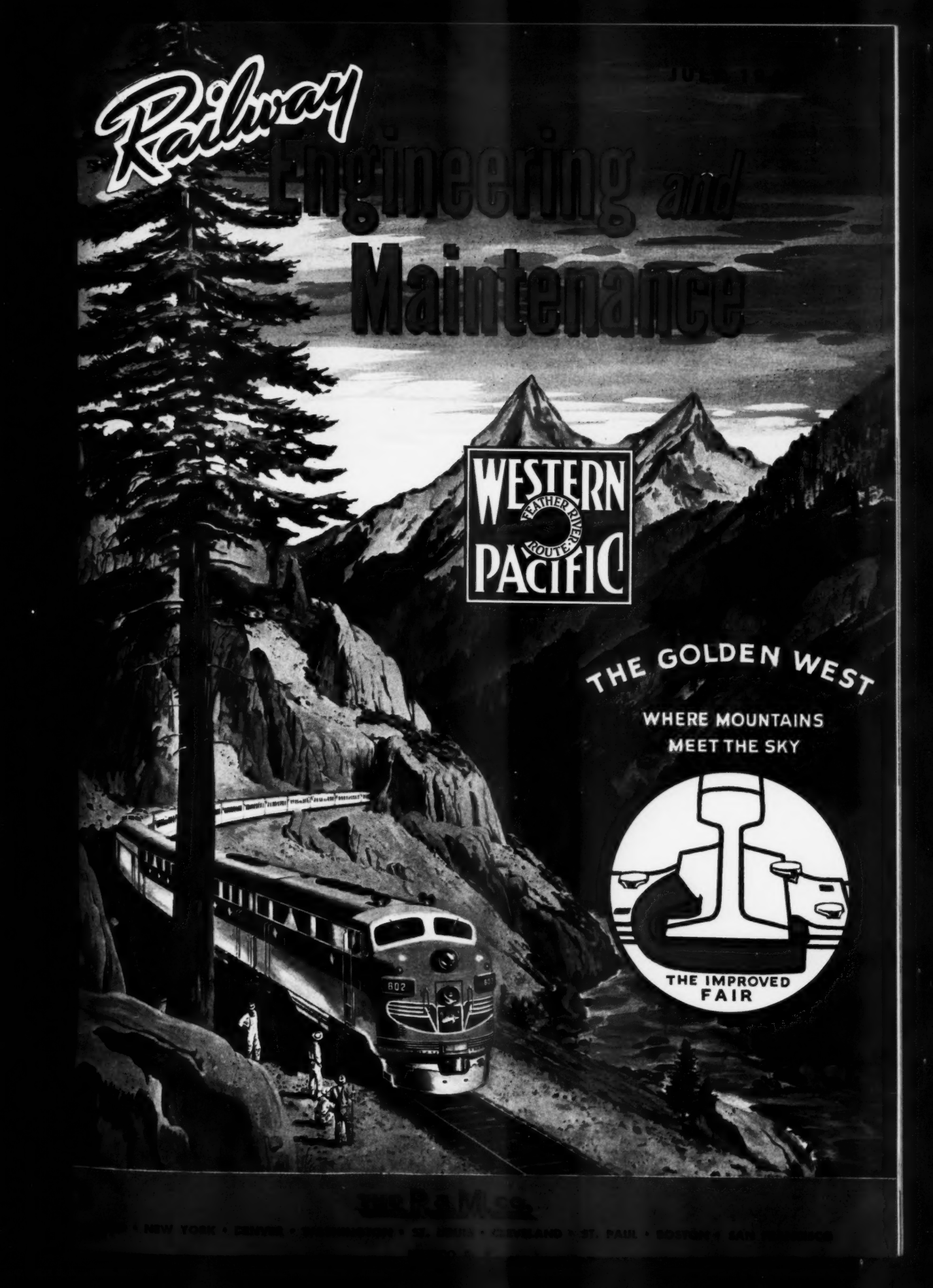
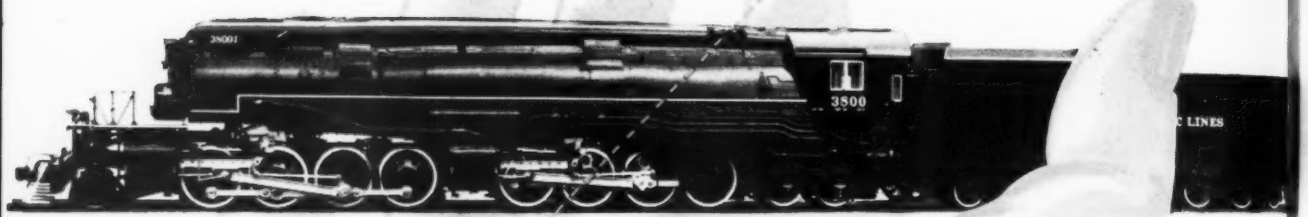

Railway
Engineering and
Maintenance
WESTERN
FEATHER RIVER ROUTE
PACIFIC
THE GOLDEN WEST
WHERE MOUNTAINS
MEET THE SKY
THE IMPROVED
FAIR

# Match for

# 345 TON GIANTS




MULTI-TON GIANTS like this 16-driver articulated job on the Southern Pacific haul heavier revenue loads.

. . . and place heavier responsibilities on right-of-way maintenance men.

Although new, heavier rail eases the maintenance burden, it can't solve the problem of joint deterioration due to strains imposed by heavier motive power and wheel loads and higher speeds.

But these monster power plants meet their match in Reliance Hy-Crome Pressure Springs. Made from fatigue-resisting steel of special analysis, developed by Reliance Research Engineers in cooperation with railroad men who know maintenance problems, Reliance Hy-Crome Pressure Springs have powerful, long-enduring reactive force which automatically compensates for looseness as a result of wear in rail bolts. Rail joints stay *tighter longer.*

For helpful hints on maintenance economy, write for a copy of the Reliance Hy-Crome family folder

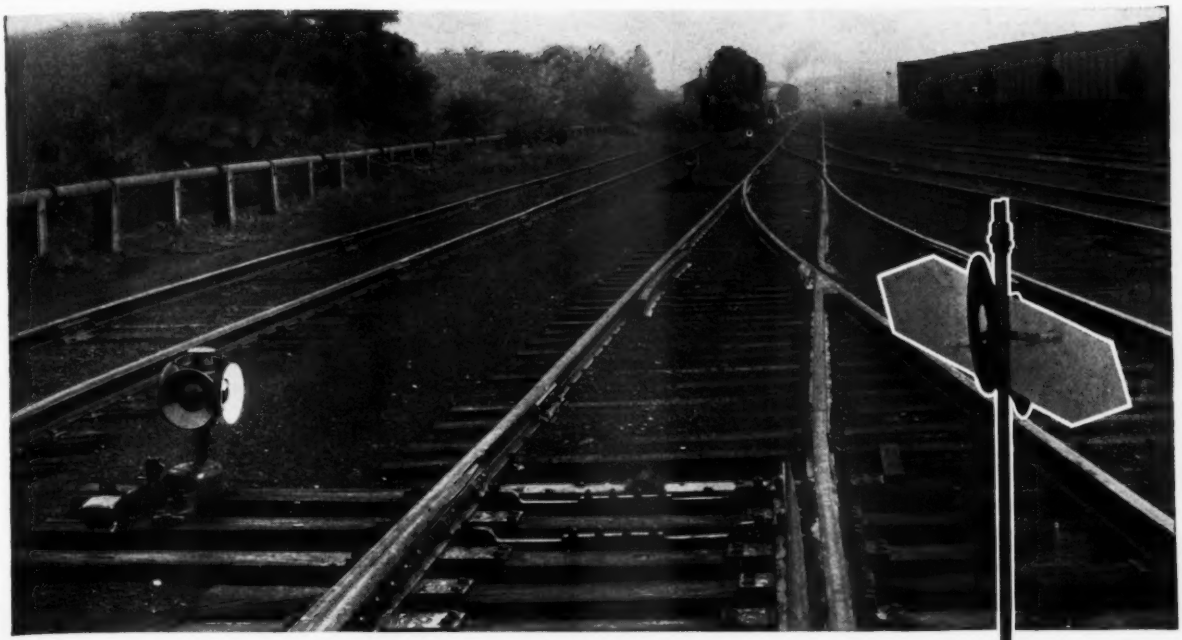
Reliance **HY-CROME** pressure springs

**EATON**

**EATON MANUFACTURING COMPANY**

**RELIANCE DIVISION**
**MASSILLON, OHIO**

**Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal**



A string of Bethlehem New Centuries in ladder track.

# *A Great Name in Switch Stands*

# BETHLEHEM NEW CENTURY

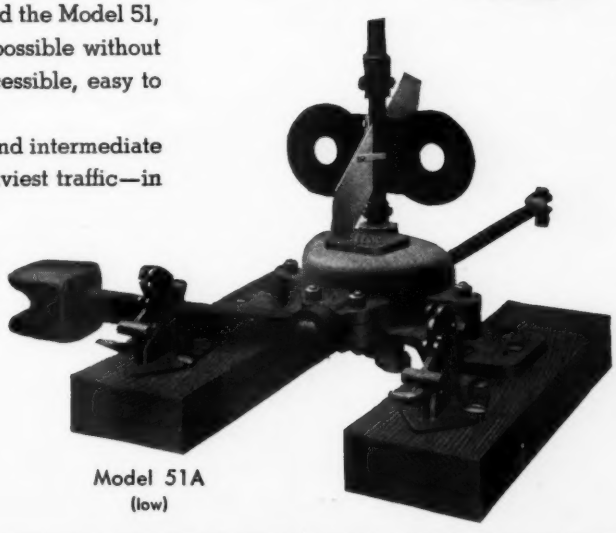
Model 51B
(intermediate, with extension top)

It's a name well known to railroad men for fifty years or more—and today's New Century, best of a long line, continues the family tradition of complete dependability.

One reason is its sturdiness; its rugged, carefully-engineered parts. Another is its basic simplicity . . . there is little about it that can get out of order.

A parallel-throw stand, the New Century is easy to operate. It is made in two designs: the non-adjustable Model 50, and the Model 51, equipped with internal shims that make adjustment possible without disconnecting the stand. These shims are readily accessible, easy to handle; changes in setting can be made in a jiffy.

Bethlehem's New Century is available in both low and intermediate types. Use it with 60-lb rail and over at points of heaviest traffic—in main lines, branch lines, and yards.



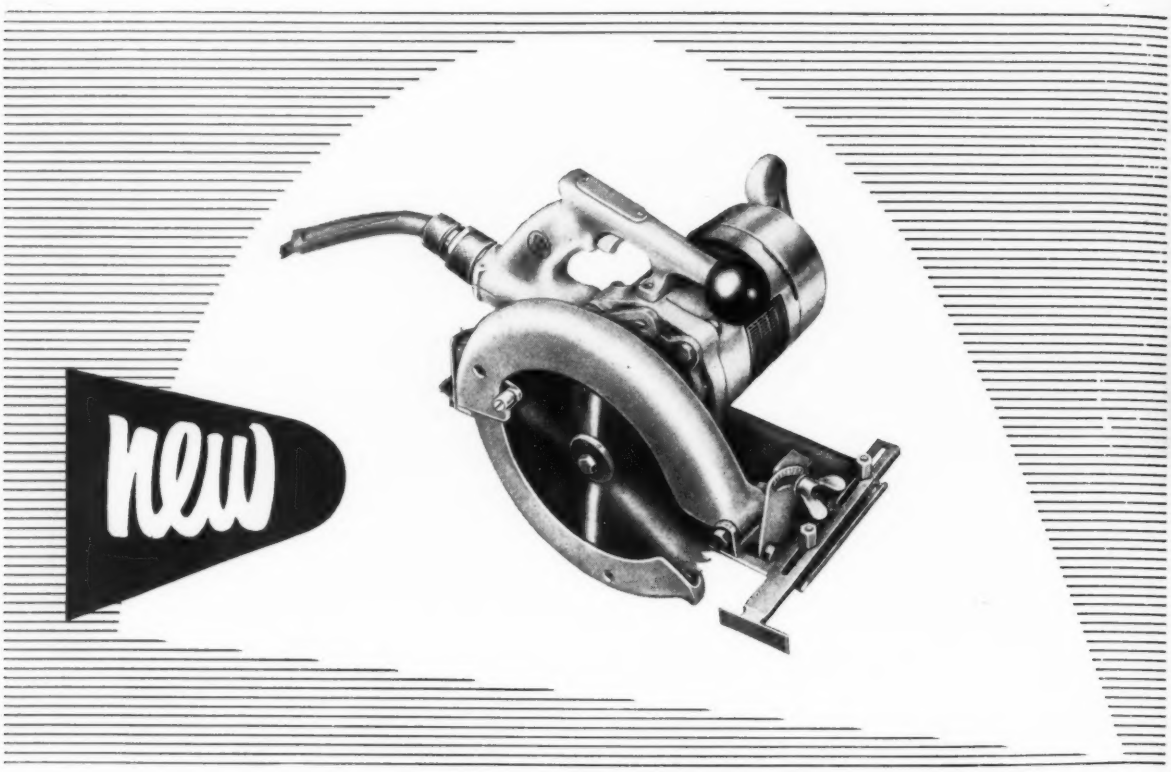
Model 51A
(low)

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
*Export Distributor:* Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

Published monthly by Simmons-Boardman Publishing Corporation, 79 W. Monroe St., Chicago 3, Ill., Subscription price: United States and Possessions, and Canada, $2.00 for one year; $3.00 for two years. Single copies 50 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 79 W. Monroe St., Chicago 3, Ill.




# CP Hi-Speed Electric Saws -with reserve cutting power

Helical gearing, high blade speed, an extremely high powered motor, unusually rugged construction insure the necessary power to make fast, deep cuts in hard wood. Gearing requires only occasional lubrication and no special lubricants. Lifetime bearings are self-lubricating.

Made in three sizes: 7½", 8¼" and 9½" blades.

Outstanding features include 55° of bevel adjustment, 10° more than any other saw; easy adjustment of depth of cut from zero to 2 7/16" on the 7½" blade, 2 13/16" on the 8¼" blade, and 3¼" on the 9½" blade.

Special blades can be furnished for cutting through nails, copper, brass, bronze, lead, tile, glass, brick, clay products, concrete, marble, flagstone, asbestos, cement products and composition board.

For complete information write for Bulletin 3000.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



*For additional information, use postcard, pages 655-656*

# THIS DEVICE

## ...means greater safety on the line!

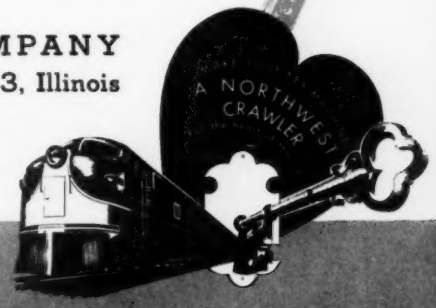
**EASY** operation does not require complications. This is all there is to the "Feather-Touch" Clutch Control.

- It is a simple drum device that utilizes the power of the engine to throw the heavy drum clutches.
- It operates in direct ratio to the pressure of the operator's hand.
- It assures the *feel of the load.*
- Release is positive and the operator does not have to hold the lever to keep the clutch engaged.

Here is ease of operation without the complications of tubing, pumps, valves or refills. It is not affected by temperature or weather and your Northwest cannot be shut down by control failure.

Plan ahead to have a Northwest on your section. Let us send you complete details.

**NORTHWEST ENGINEERING COMPANY**
1513 Field Bldg., 135 South LaSalle St., Chicago 3, Illinois




# NORTHWEST

THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

# the New TRUE TEMPER RAIL ANCHOR

- CANNOT BE OVERDRIVEN
- ESPECIALLY ADAPTED TO WORN AND CORRODED RAIL BASES
- EASE OF APPLICATION
- EASE OF REMOVAL
- EFFICIENT ON RE-APPLICATION

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**The American Fork and Hoe Company**
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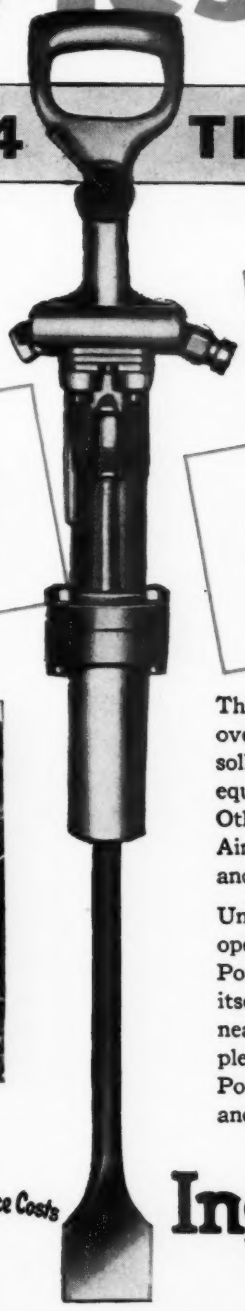
SCOOPS • SCUFFLE HOES • AXES • HAMMERS • HATCHETS • SCYTHES • WEED CUTTERS

# 40% less air

## *with the* MT-4 TIE-TAMPER



**The greatest Tamper for ease of handling.**

**Takes less air . . . permitting operation of more tampers from your present compressor equipment.**

**Powerful . . . the same or even more blows than tampers you are now using.**

**Rugged and constructed of simple parts for longer life with less attention.**

*MT-4 Tamping Guns operating from a DR-60 compressor*

This new Tamping Gun is the result of over 35 years of continual efforts by Ingersoll-Rand in developing and improving equipment for the Railroad Industry. Other I-R equipment includes all types of Air Tools and a complete line of on-track and off-track compressors.

Under today's conditions there are many operations on which Ingersoll-Rand Air-Power equipment saves enough to pay for itself in a matter of days. Consult the nearest Ingersoll-Rand branch for complete information on proven I-R Air-Power equipment for bridge-and-building and maintenance-of-way work.

AIR POWER ... The Key to Lower Maintenance Costs

**Ingersoll-Rand**

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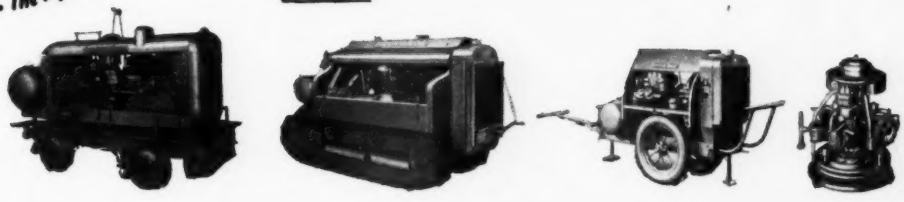
*The Originator of Mechanical Tamping*



**Compressors for Railway Maintenance Work**

✓ EASY ON THE OPERATOR

✓ EASY TO HANDLE AND SPOT

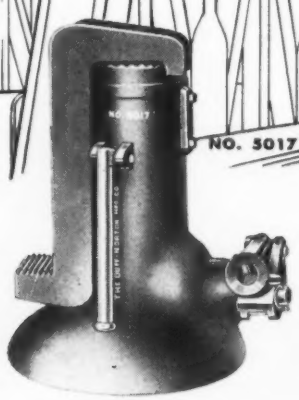
✓ SAFE AND DEPENDABLE

THAT'S WHY

# DUFF-NORTON JACKS

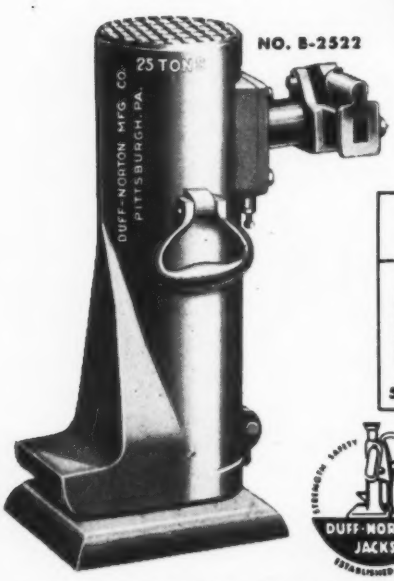
ARE BEST FOR

## *Bridge Construction and Maintenance*




NO. 5010-C-2

NO. B-2522




Built for rough outdoor service, Duff-Norton Jacks require a minimum of effort in lifting or lowering heavy beams, rigging, heavy machinery and equipment used on bridge construction and maintenance jobs—due to leverage, ball bearing action and accurately machined parts.

**JACK ADJUSTMENT CONTROLLED TO WITHIN A FRACTION OF AN INCH**

Heavy loads are supported for long periods of time without danger of creeping or settling—with precision adjustment control. Write today for descriptive catalog.

***There's a Duff-Norton Jack for every need.***

**QUICK REFERENCE GUIDE FOR BRIDGE JACKS YOU NEED**

| Jack No. | Capacity Tons | Height Inches | Raise Inches | Base Inches | Head Diam. Inches | Foot Lift Ht. Inches | Weight Pounds |
|---|---|---|---|---|---|---|---|
| 915 | 15 | 14¾ | 9 | 6 x 7½ | 3½ | — | 42 |
| B-1522 | 15 | 22 | 10 | 7½ x 9¾ | 4¾ | 3⅛ | 112 |
| B-2522 | 25 | 22 | 10¼ | 8 x 9¾ | 5¾ | 3¾ | 142 |
| B-3526 | 35 | 26 | 14 | 9 x 10½ | 6¾ | 3¾ | 208 |
| B-5024 | 50 | 24 | 10¾ | 14 diam. | 10¼ | 5¼ | 270 |
| 5017 | 50 | 16½ | 7 | 14 | 5½ | 5 | 195 |
| 5010-C-2 | 50 | 10 | 4½ | 7⅛ | 4 | — | 64 |

**THE DUFF-NORTON MANUFACTURING CO.**

Main Plant and General Offices: PITTSBURGH 30, PA. — Canadian Plant: TORONTO, ONT.

*"The House that Jacks Built"*

**THE WORLD'S OLDEST AND LARGEST MANUFACTURER OF LIFTING JACKS**

# We changed from steam to an **Industrial Brownhoist Diesel Crane**

*It paid for itself in four years!*

Here are the figures to prove it:

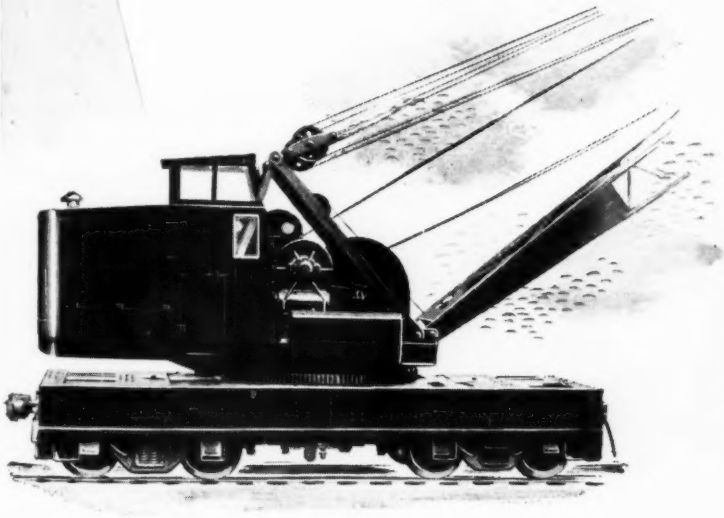
SAVINGS IN FUEL PER DAY ..... $13.40
(Based on 1½ tons coal per day at $10 a ton, against 16 gallons of fuel oil at 10¢ a gallon.)

SAVINGS IN LABOR PER DAY ..... $15.50
(Unproductive firing, banking, cleaning time — 2 hours for engineer at $1.75 per hour, and 8 hours fireman, at $1.50 per hour.)

TOTAL FUEL AND LABOR SAVINGS PER YEAR.. $7,514.00

**AND WE INCREASED OPERATING TIME BY 65 DAYS A YEAR!**

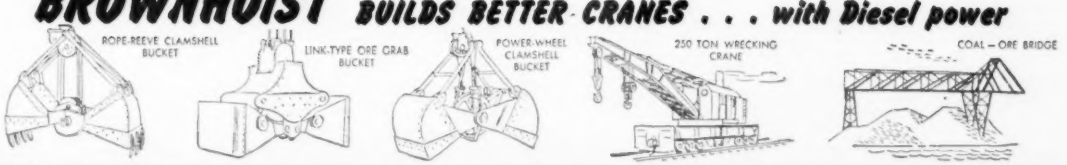
It takes two hours a day on the average for firing up, banking, taking coal and water, boiler washouts, etc. That figures to 10 hours a week, 520 hours a year, or 65 extra days of productive crane time each year.



**BESIDES THESE IMPORTANT EXTRAS:**

Safer, cleaner operation; greater production and less operator fatigue because of air operated controls; reduced maintenance time, about one-half that of steam, and elimination of smoke nuisance and fire hazard. Write today for complete information.

## BROWNHOIST BUILDS BETTER CRANES . . . with Diesel power




**INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICH. • DISTRICT OFFICES:** NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO • **AGENCIES:** DETROIT, BIRMINGHAM, HOUSTON, LOS ANGELES, PORTLAND, SAN FRANCISCO SEATTLE, SPOKANE, CANADIAN BROWNHOIST LTD., MONTREAL, QUEBEC.

# YOU CAN OPERATE BOTH HIGH CYCLE AND STANDARD 110 VOLT TOOLS

## with this

# HOMELITE

## *Carryable Gasoline-Engine-Driven Generator*

## ...A WIDE-OPEN FIELD FOR GREATER SAVINGS

HOMELITE PAVING BREAKER

HOMELITE CHAIN SAW

Because they do more work and weigh less . . . because maintenance costs are cut in half . . . high-cycle tools are being used on more and more construction jobs . . . concrete vibrators, grinders, impact wrenches, chain saws, electric paving breakers and an ever-increasing number of others. They are indeed the last word in greater efficiency.

And here is Homelite's answer to those who want to cash in on the advantages of high cycle tool operation. It's a compact gasoline-engine-driven dual-purpose generator . . . the first and only one of its kind . . . a complete power unit you can pick up and carry to operate your high cycle tools *any place you want.*

### NO LOSS ON PAST INVESTMENTS

Even though you have made substantial investments in standard 110 volt tools, you have nothing to lose. For this Homelite Generator operates *both* high cycle and standard universal tools with equal efficiency.

*Look into this new Homelite Dual Purpose Generator...the Carryable Power Plant of the Future. Send for bulletin...or, better...let us give you a free on-the-job demonstration. Write, today.*

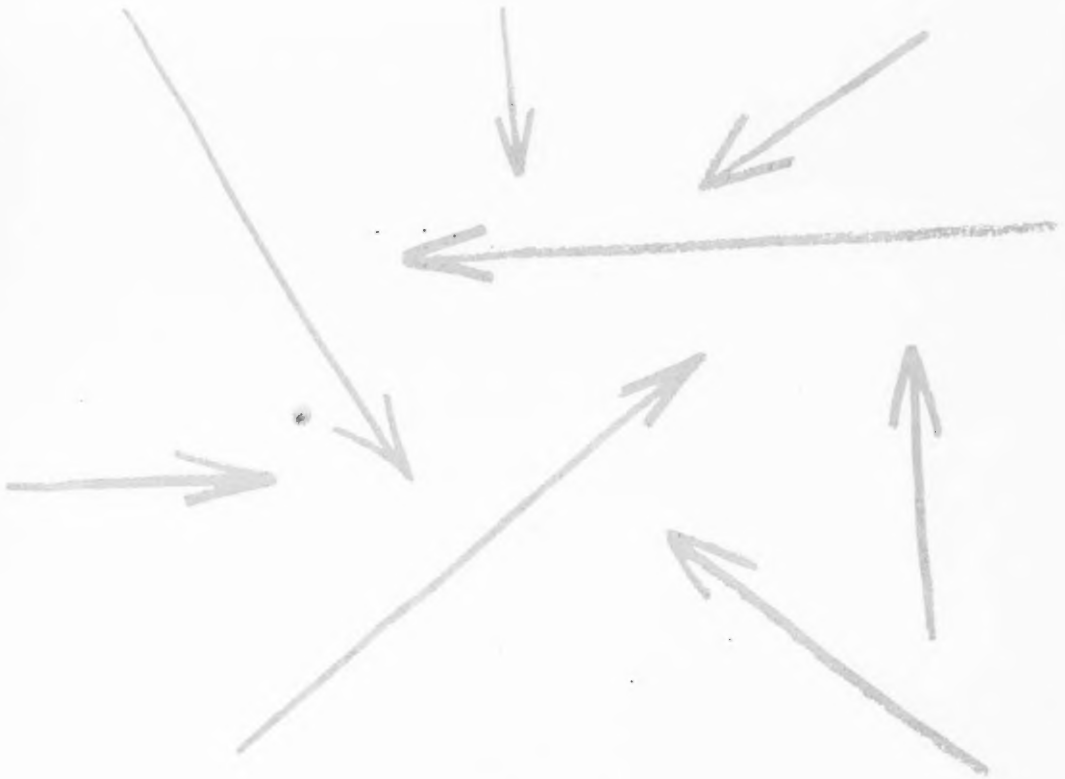
# HOMELITE CORPORATION

**CARRYABLE PUMPS · GENERATORS · BLOWERS**

**207 RIVERDALE AVENUE, PORT CHESTER, NEW YORK**



*For additional information, use postcard, pages 655-656*



# They're all the same to a TIMKEN® bearing

NO MATTER from what direction the loads may come, Timken® roller bearings carry them all safely—dependably. Timken bearings are tapered in design—carry both radial loads, thrust loads and any combination of them.

With Timken bearings in your product, auxiliary thrust bearings and thrust plates are eliminated. Designs can be simplified, space saved, cost reduced.

You have a better-working product, too. The tapered construction of Timken bearings prevents end-play and holds shafts in proper alignment. Wear on surrounding parts is reduced; gears mesh more smoothly.

And Timken tapered roller bearings give you these added advantages: Due to the line contact between rolls and races, they have extra load carrying capacity. True rolling motion and smooth surface finish practically eliminate friction. Timken bearings permit the use of closures which keep lubricant in—dirt out. And since they're made of Timken fine alloy steel, Timken roller bearings normally last the life of the machine in which they are used.

Dependable performance and public acceptance of Timken bearings have made Timken-bearing-equipped products first choice throughout industry. They add a valuable sales feature in your product—build greater acceptance among customers. When you specify bearings for your product, specify "Timken". And when buying new equipment, always look for the trade-mark "Timken" on the bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

*50th birthday of the company whose products you know by the trade-mark:* TIMKEN

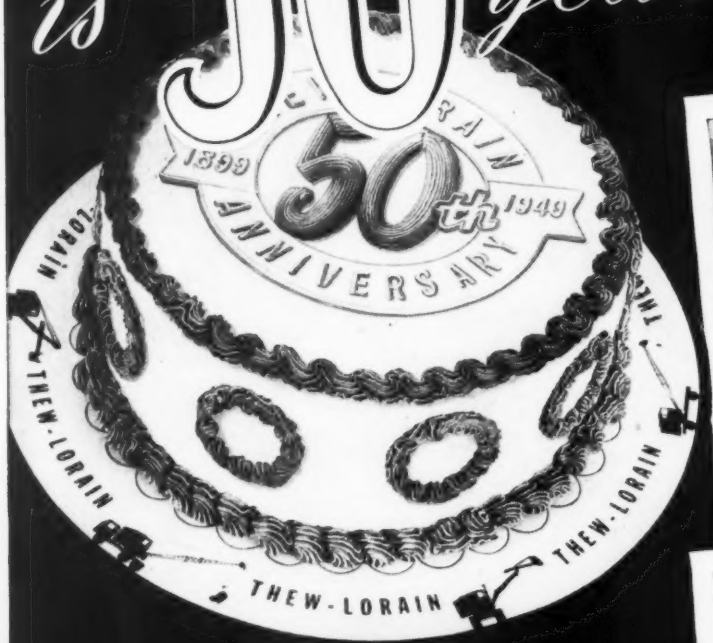
TIMKEN 1899 50 YEARS 1949

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

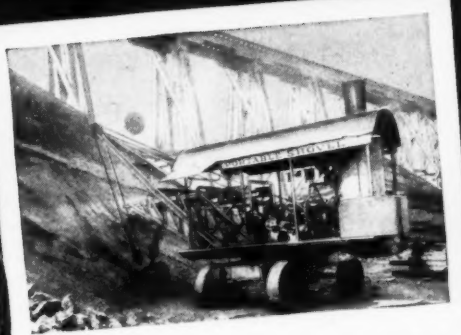
TAPERED ROLLER BEARINGS

# THEW-LORAIN is 50 years young!

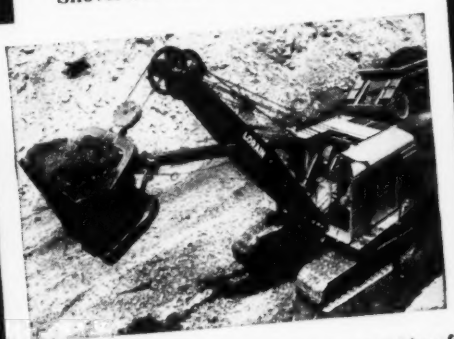



50 years ago — July 17, 1899 — an idea became an industry — an industry still going strong today as The Thew Shovel Co. Thew alone hasn't made this anniversary possible. It's due largely to you and your repeated confidence in Thew-Lorain products. We're old only in our years of experience and "know-how" . . . but young as ever in our ideas and efforts to serve you better, today and tomorrow.

THE THEW SHOVEL CO., LORAIN, OHIO



**1899** . . . First full revolving shovel as designed and built by Captain Richard Thew in 1895. After 4 years of operation as a private business, The Thew Shovel Co. was incorporated in 1899.



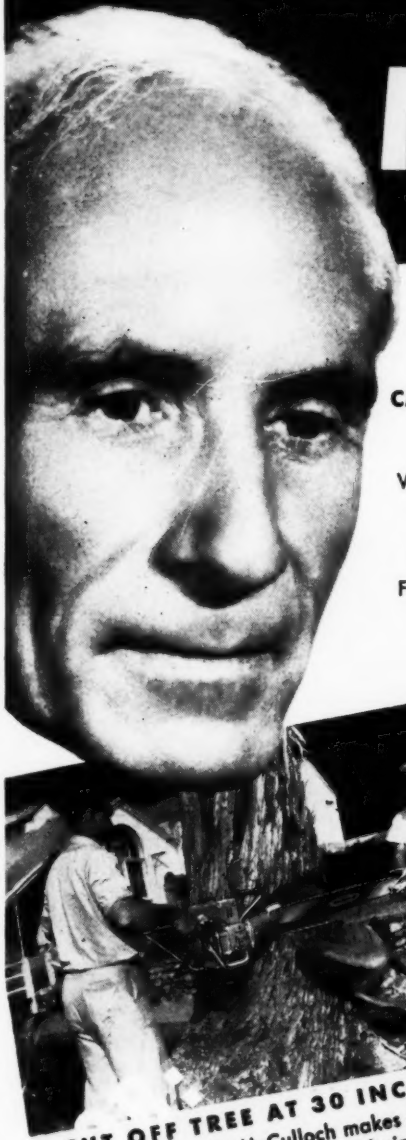
**TODAY** . . . The world's largest builder of commercial size shovels, cranes, clamshells, draglines and hoes, mounted on crawlers or rubber-tires, is identified by the trademark "Thew-Lorain."

THEW-LORAIN 1899 50th 1949 ANNIVERSARY

50 YEARS devoted exclusively to the design and manufacture of Power Shovels & Cranes.

THEW Lorain

# "From then on, we bought McCULLOCHS"

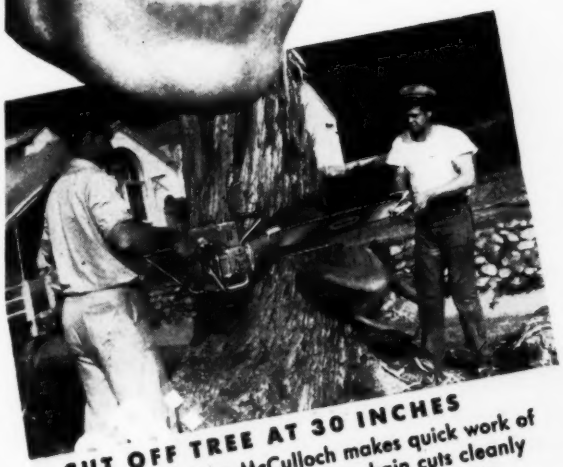


McCULLOCH McC CHAIN SAWS

## Ralph C. Puckett

**CALIFORNIA TREE SERVICE, Los Angeles, says**

"We really gave our first McCulloch chain saw a work-out. We tested it on big trees, little trees, branches, hard wood, soft wood, palm, roots, knots, and angle cuts. We found the McCulloch cut faster, was easier to use and carry, and saved money on sharpening. From then on, we bought McCullochs. We've now got ten more like the first, and they're all the best saws we've ever used."



**CUT OFF TREE AT 30 INCHES**

The 5-hp McCulloch makes quick work of big trees. The Rip-Cross chain cuts cleanly in any direction—saves time on angle cuts and roots, as well as crosscut or rip.

**LIMB AND BUCK FELLED TREE**

Light weight (49 lb. as shown) and good design make McCullochs easy to handle, save muscles and time. Another time-saver on the job is easy sharpening and no setting of chain teeth.

**SIX MODELS AVAILABLE**

*All prices f. o. b. Los Angeles*

20-inch Chain Saw..$385.00

30-inch Chain Saw..$395.00

40-inch Chain Saw..$405.00

50-inch Chain Saw..$415.00

60-inch Chain Saw..$425.00

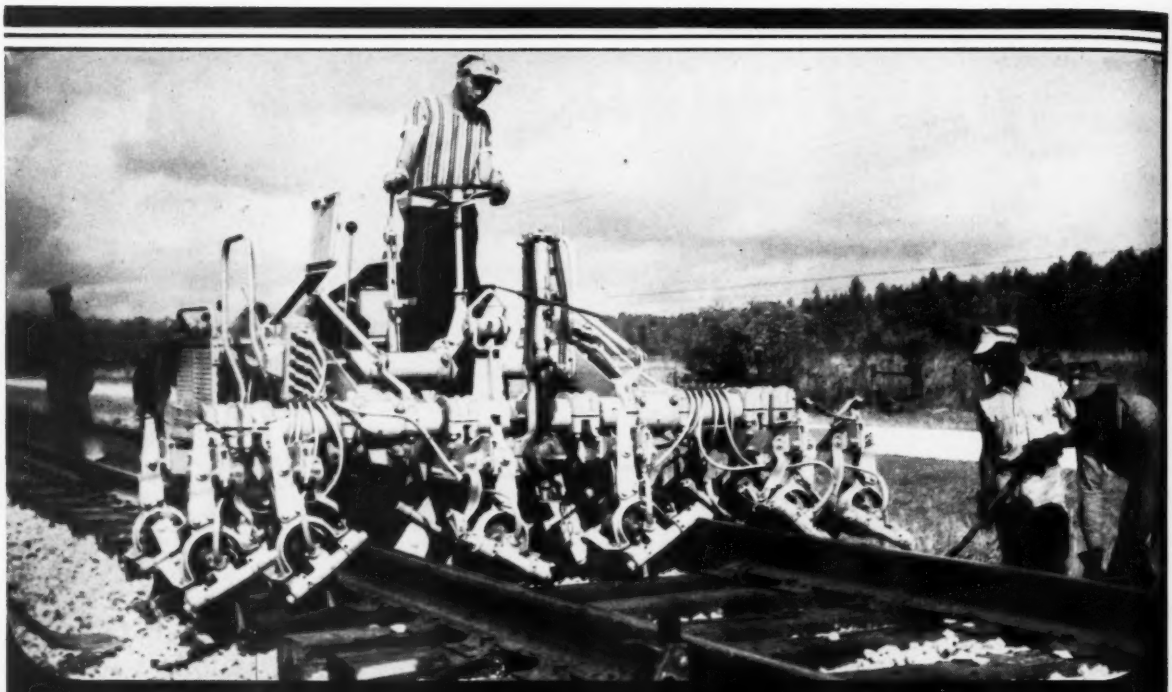
20-inch Bow Saw...$425.00

NATIONWIDE SALES AND SERVICE

**McCULLOCH MOTORS Corporation**

6101 West Century Boulevard
Los Angeles 45, California

***Write*** **FOR ILLUSTRATED LITERATURE OR NAME OF NEAREST DEALER**



# THE JACKSON "M-T"

## ——— a sound solution to the 40-HOUR-WEEK PROBLEM: ———

If higher pay rates and the 40 hour week appear to make adequate ballasting operations impossible within the limits of your budget, do one of two things:

**1.** Call in a Jackson consulting engineer — a practical individual thoroughly trained in maintenance methods and practice and one who talks your language. He can answer all your questions in short order and explain how the Jackson "M-T", operating under the conditions obtaining on your particular road, can help you to a sound solution of your problem. Or . . .

**2.** If you would rather simply study a Jackson "M-T" in actual operation, write for nearest location.

Prompt deliveries can be made to those who wish to capitalize on the tremendous advantages of this machine during the rest of the season. Write, wire or phone us, Now!

**ELECTRIC TAMPER & EQUIPMENT CO. Ludington, Michigan**

# THE JACKSON 4-TAMPER OUTFIT

## SECTION GANG PRODUCTION BOOSTER

## *Finest of Unit Tampers for Extra Gang Service*

In your search for rock-bottom maintenance costs, necessitating staying within the 40-hour week, don't overlook the great boost in productivity Jackson standard tampers and power plants can give to your section gangs.

Equipped with 4 Jackson standard tampers and our Model M-2 Power Plant, a section gang will turn out a whale of a lot more work and better work than can be done by hand or with any other hand-guided mechanical tampers. For spot tamping, skeletonizing and such out-of-face surfacing as is usually done by the average section gang, the Jackson 4-Tamper outfit is truly ideal. Moreover, whenever desired these outfits can be grouped in extra gang service for a general lift or major ballast insertion — with results that are surpassed only by the multiple tamper. Get the complete facts. Write, wire or phone us, NOW!

**ELECTRIC TAMPER & EQUIPMENT CO. Ludington, Michigan**

*Get Results!*

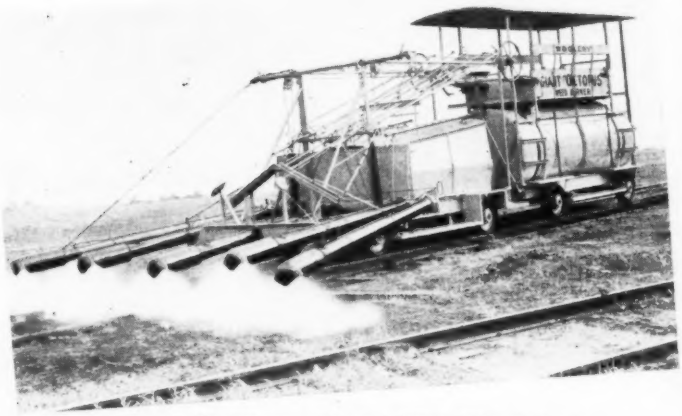
# WITH YOUR RIGHT-OF-WAY MAINTENANCE DOLLAR!

***USE MODERN***

# WOOLERY

***WEED BURNERS***

**Dual Purpose . . .**
**Woolery Combination Chemical Sprayer and Burner**

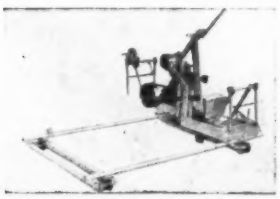


**Woolery Giant Octopus Model WB2 Weed Burner**

## *BURN ALL WEEDS FAST—CLEAN— AT LOW COST!*

Use a WOOLERY Giant Octopus 5 burner Weed Burner and you destroy all weeds with a solid wall of flame 25 feet wide *on the first trip!* On a second trip you can burn up to 35 feet wide, at speeds up to 15 M.P.H. This means a weed free track that in turn means a smoother, safer roadbed, and less maintenance.

**Woolery Tie Plate Spacer**



**Woolery Tie Cutter**

Burns weeds in ditches too! Perfect control and plenty of flexibility are built into Woolery Weed Burners to burn weeds, leaves, and other things along embankments or in ditches. Other Woolery Weed Burning Units feature 1, 2 and 3 burner models to meet specific weed burning requirements. Also a Woolery Combination Chemical Sprayer and Weed Burner is available for killing weeds near buildings or in areas where burning is not possible.

Do what more than 75 major railroads are doing to get full value from their railroad maintenance dollar. Use Woolery Weed Burners to keep your roadbeds weed free!

***WRITE TODAY FOR NEW BULLETINS***

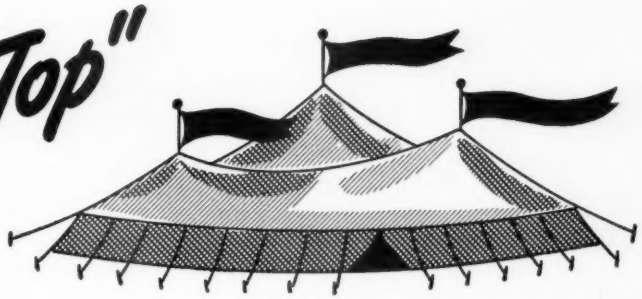
**WOOLERY MACHINE COMPANY**
**MINNEAPOLIS** Pioneer Manufacturers of **MINNESOTA**

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS • MOTOR CARS • TIE CUTTERS • TIE SCORING MACHINES • RAIL JOINT OILERS • CREOSOTE SPRAYERS • BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

# Take a Tip From The "Big Top"



Ever watch a circus tent go up? You'll get an even greater kick watching the erection of your ARMCO STEELOX Building.

Like the "Big Top" it goes up in a jiffy, and if necessary can always be moved to a new location. But there the similarity ends. With STEELOX you have all the added advantages of a permanent structure. These attractive buildings are weathertight, fire-resistant, and lightning-safe when properly grounded.

Long life is assured because STEELOX Sections are made of 18- and 20-gage ARMCO ZINCGRIP-PAINTGRIP Steel. This durable material is 2 to 3 times heavier than ordinary galvanized siding and roofing. About the only maintenance ever required is an occasional painting. Even here you save, as the Special-Purpose ARMCO Steel takes paint without pre-treatment and holds it longer.

ARMCO STEELOX Buildings are ideal for yard offices, waiting stations, tool houses, Diesel motor garages, machine shops and wherever else you need efficient, economical shelter. There is a type and size for every need, with widths from 4 to 36 feet, lengths from 4 to 200 feet or more. Write for prices and other data. Armco Drainage & Metal Products, Inc., 2895 Curtis St., Middletown, O. Subsidiary of Armco Steel Corp.

*Export: The Armco International Corporation*

ARMCO

## ARMCO STEELOX BUILDINGS

# How to save 50% on

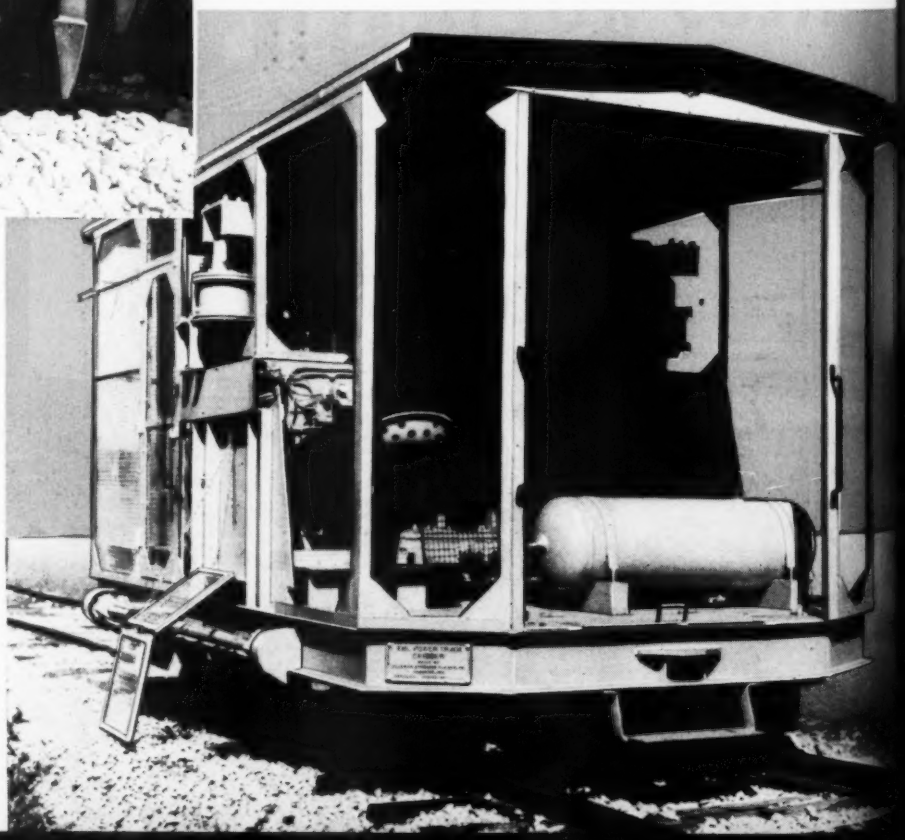
## USE MACHINE POWER

### PULLMAN-STANDARD POWER TRACK CRIBBER

Mechanized track maintenance is recognized as "the fastest moving trend in railroading today." These powerful track cribbers and ballasters are in the forefront of that trend.

This revolutionary power cribber does the work of large crews with hand tools, in removing fouled and compacted ballast from between the ties preparatory to resurfacing the track. It cleans out each crib uniformly, at a rate far beyond that possible with any previous means, at any comparable cost. It operates effectively in all types of ballast, in all track conditions, day or night. Four lateral wheels permit removal from track under its own power in less than five minutes.

Write for analysis comparing cost with gang operations under varied track, ballast, and traffic conditions.



**PULLMAN-STANDARD POWER TRACK CRIBBER IN POSITION ON TRACK**

Close-up shows digger bars, with "impact" bars preparing the crib ahead. Diggers contact the ballast serially, moving the ballast progressively from track center to ends of crib. Depth of digging may be varied for different track conditions and heights of rail.

# Roadbed Maintenance Costs

## TO SAVE MAN POWER!

Like the cribber, this power ballaster greatly increases the production of maintenance gangs. Its output of uniformly ballasted track is faster, better, and cheaper than that of previous methods of track improvement. Performance is uniform, regardless of track raise or ballast conditions. In one on-line experience, for example, results over an extended period showed that this machine enabled one gang (enlarged by only 50%) to *triple* its daily production, cutting maintenance costs *in half*. Other tests under all conditions have produced similar benefits. These figures also are available for your study. Write for them, today.

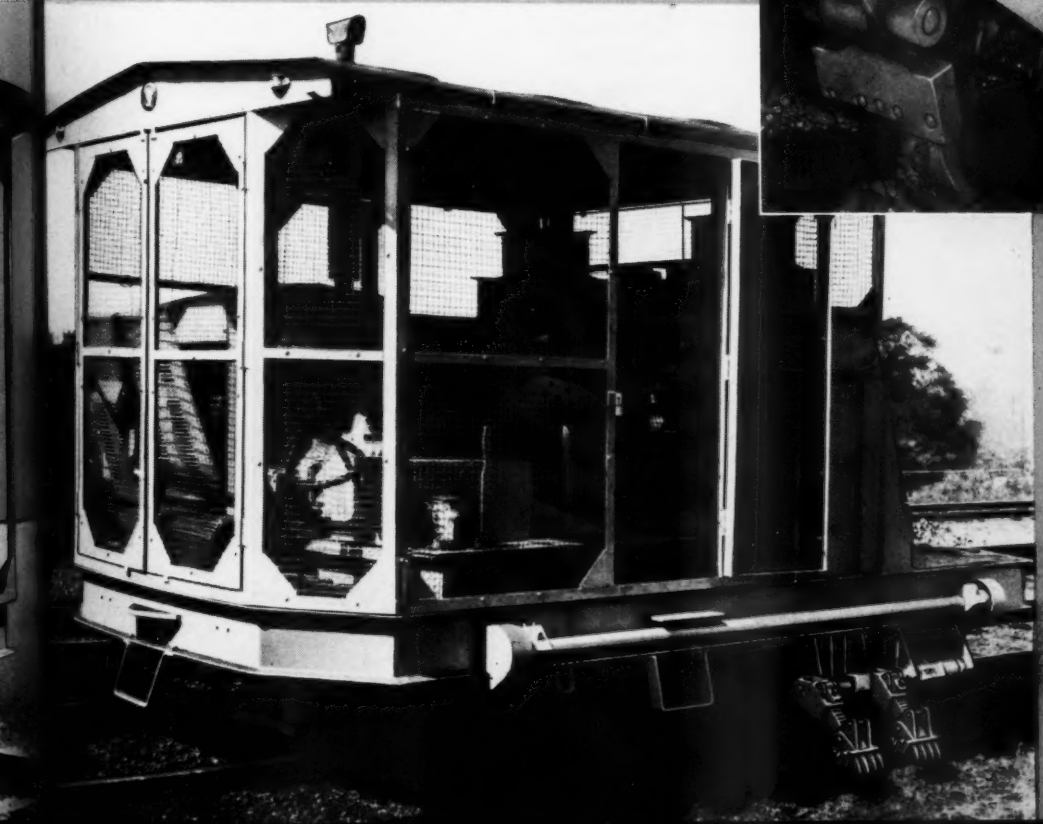
**PULLMAN-STANDARD POWER BALLASTER**

# Pullman-Standard

**CAR MANUFACTURING COMPANY**

*Power Ballaster Division*

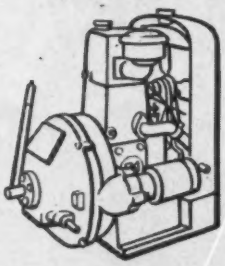
CHICAGO • NEW YORK • CLEVELAND • WASHINGTON, D. C. • PITTSBURGH • BIRMINGHAM
WORCESTER, MASS. • *SAN FRANCISCO SALES REPRESENTATIVE: MARK NOBLE*

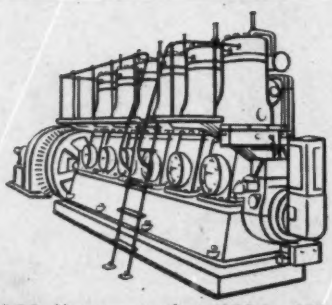


**PULLMAN-STANDARD POWER BALLASTER ON TRACK**

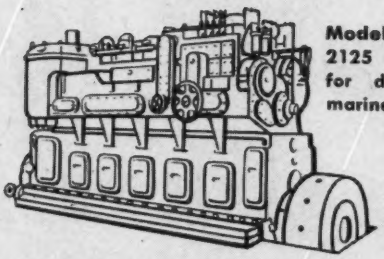
The detail view shows tamping shoes at low position along the tie base. Ballast feed shoes are in extended position; these work the loose ballast back into position between the ties. Like the cribber, this power ballaster can be removed from the track under its own power in less than five minutes.

Model 45B: 5¼ horsepower engine for stationary and marine service.



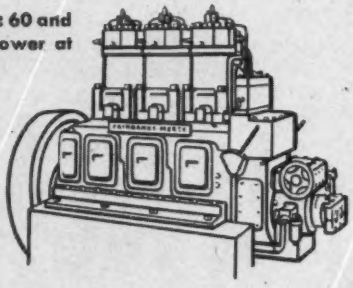


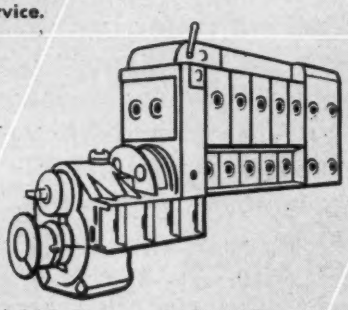
Model 32: Horsepower from 120 to 450. For slow-speed heavy-duty service.



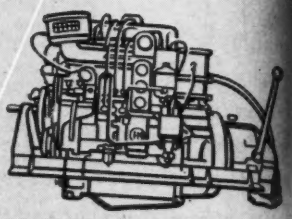
Model 37: 500 to 2125 horsepower for direct drive marine service.

Model 42: 60 and 90 horsepower at 450 r.p.m.

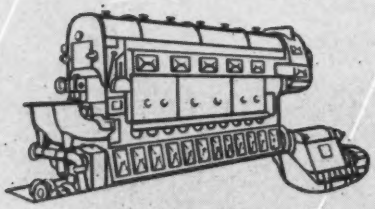




Model 31: Horsepower from 175 to 500; with 2 to 1 reduction gears optional for marine service.

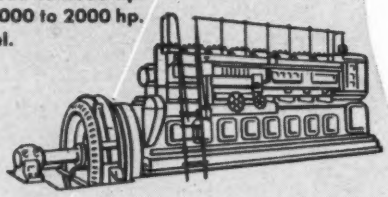


Model 48 Marine Engine: Also available for stationary or portable service. 3.5 to 80 hp.



Model 38 Opposed-Piston Engine: Horsepower from 960 to 1920 with 2 to 1 reduction gear for marine service.

Model 33 Stationary Engine: 500 to 2000 hp. Diesel, 1000 to 2000 hp. Dual Fuel.



# When it comes to Diesel Power...

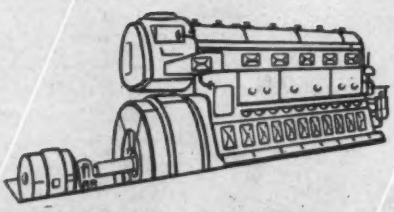
## From 3.5 hp. to 3500 hp.

Low-cost, efficient power for all marine services . . . modern, dependable power for newest, fastest road locomotives . economical power for largest to smallest municipal and industrial plants . Fairbanks-Morse is the proved source for the full range of diesel applications. For skilled assistance and impartial recommendation for the diesel for your specific service, write Fairbanks, Morse & Co., Chicago 5, Ill.

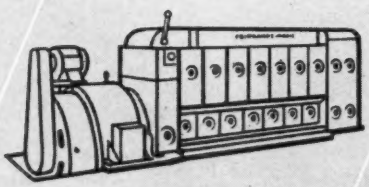
**FAIRBANKS-MORSE**

***A name worth remembering***

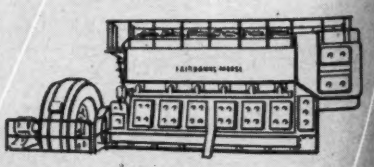
DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES
MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR
CARS and STANDPIPES • FARM EQUIPMENT • MAGNETOS



Model 38 Opposed-Piston Engine: 960 to 1920 horsepower at 720 r.p.m.



Model 31: Diesel generating set with kw. ratings from 118 to 360. Marine and stationary—Dual Fuel available in larger sizes.

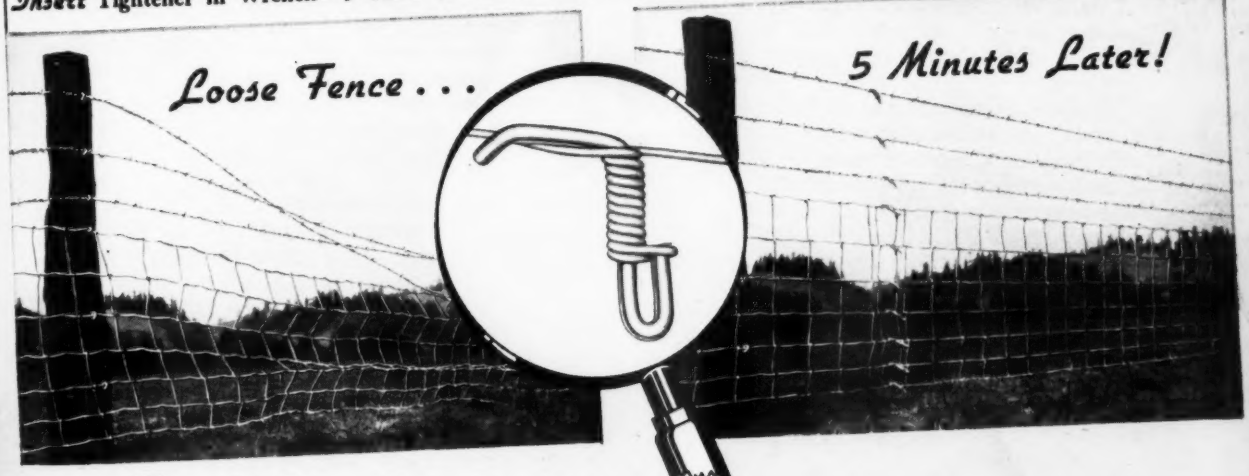


Model 31: 2100 to 3500 horsepower diesel or dual fuel engine for heavy-duty stationary service.

# BENBOW FENCE TIGHTENER

## Simple – Effective – Fast

*Insert* Tightener in Wrench— *Place* over fence wire— *Wind* up slack in wire— *Hook* and remove Wrench




*Fence Problems Made Easy!* Barbed wire and woven wire, both new and old, are effectively stretched and repaired with this simple method. Slack pulls in with a few turns of the wrench. Since the tighteners stay in the fence, it is a simple matter to retighten your fence at any time for years to come.

*Saves time — saves labor! Order now — don't delay!*

**BENBOW Fence Tightener Co.**

BENBOW, CALIFORNIA

*Manufacturers of Fence Tighteners for Barbed Wire and Woven Wire Fencing*

# "Built-in Fire Insurance..."

## KOPPERS FIRE-RETARDANT WOOD

THE effectiveness of Koppers Fire-Retardant Wood has been dramatically demonstrated under actual fire conditions as well as in tests of the Underwriters' Laboratories Incorporated.

In 1946, an explosion at an Ohio magnesium foundry tossed burning magnesium to the top of a fume hood made of Transite on a Koppers Fire-Retardant Wood framework. Although the magnesium burned for ten minutes at about 4000°F., the fire did not spread, and there was no charring beyond the area in direct contact with molten metal. No replacement of Koppers Fire-Retardant Wood because of fire damage was required.

Koppers Fire-Retardant Wood pays dividends even if you never have a fire. To all the advantages of wood . . . its easy workability, availability, decorative value, economy, re-use value . . . are added resistance to decay and termite attack as well as resistance to fire. Yet the odorless Koppers treatment does not harm the color or paintability of the wood. Where treated wood is exposed to leaching, Koppers Flame-Resistant Sealer may be used to seal salts in and moisture out, and maintain a high degree of protection indefinitely.

Koppers Fire-Retardant Wood is ideally suited for the structural members of railroad engine houses, bridges, tunnel linings and for floors, roof trusses, roofing, sheathing and similar applications. Send for a free copy of the booklet, **Koppers Fire-Retardant Wood,** for more complete information about how Koppers Fire-Retardant Wood can protect your buildings.

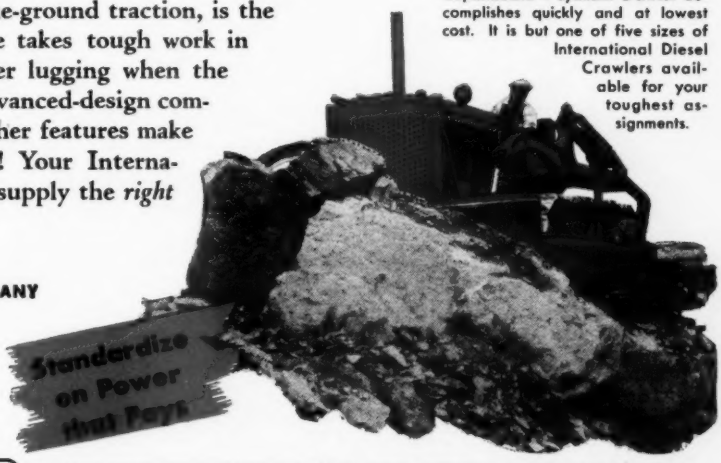
**KOPPERS COMPANY, INC., Pittsburgh 19, Pa.**

**KOPPERS** **PRESSURE-TREATED WOOD**



*For additional information, use postcard, pages 655-656*

A glutton for punishment, powered by a diesel engine with matchless lugging ability and stamina—this is the tractor for you to use on heavy, back-breaking jobs. The International Crawler, with broad-gauge stability, balance and geared-to-the-ground traction, is the worker you need. ● Its powerful engine takes tough work in stride, with increased torque for heavier lugging when the load demands it. All-weather starting, advanced-design combustion, full pressure lubrication and other features make it *your* obvious choice among tractors! Your International Industrial Power Distributor can supply the *right* size with *matched* equipment, now.




An International TD-14 Diesel puts these rocks in their place with its hydraulic blade. Removing obstacles and leveling to grade are jobs this dependable 4-cylinder crawler accomplishes quickly and at lowest cost. It is but one of five sizes of International Diesel Crawlers available for your toughest assignments.

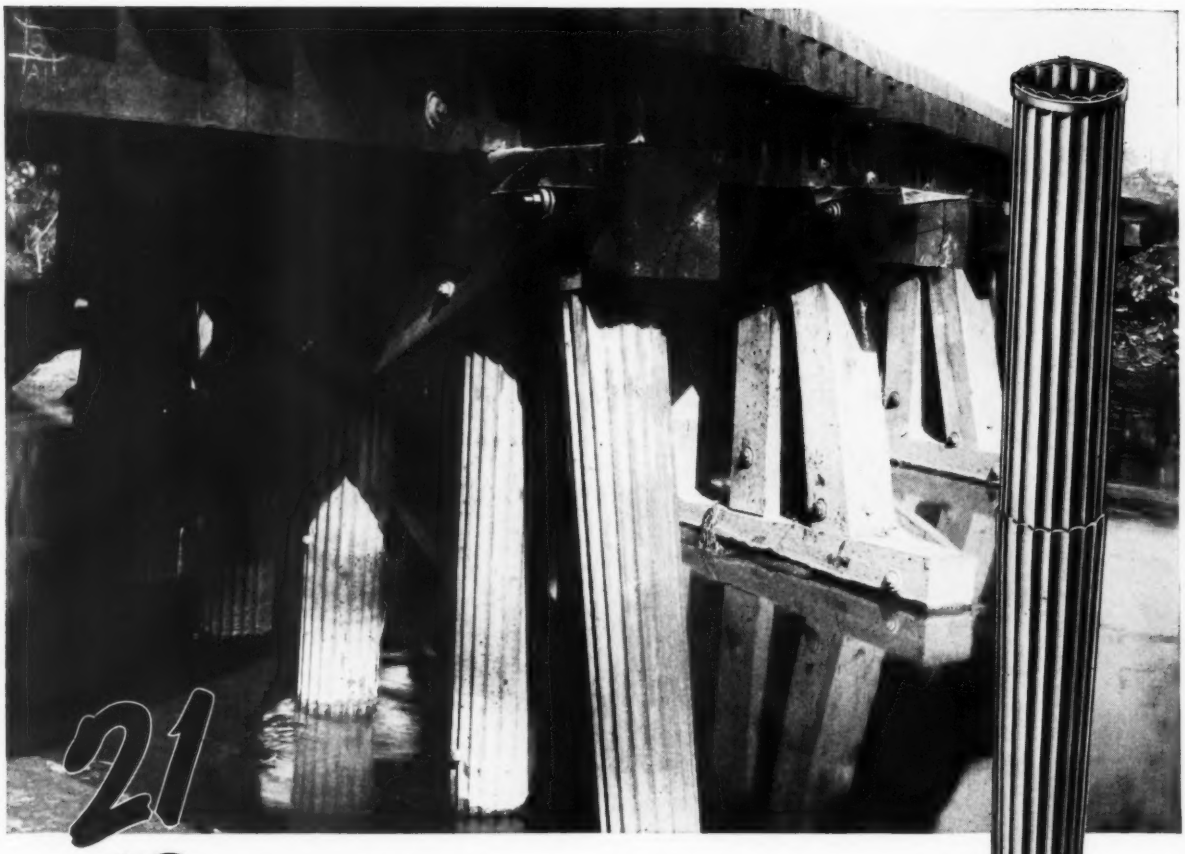
**INTERNATIONAL HARVESTER COMPANY**
**Chicago**

*Write for folder, "Semaphores Up". Contains information on cost-cutting equipment for maintenance of way work.*

**CRAWLER TRACTORS**
**WHEEL TRACTORS**
**DIESEL ENGINES**
**POWER UNITS**

INTERNATIONAL HARVESTER

# INTERNATIONAL INDUSTRIAL POWER



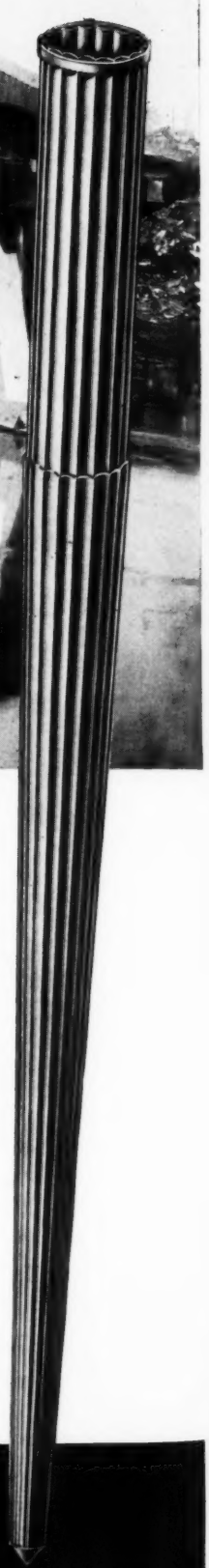

# ~~18~~ years of Service...and still going strong! MONOTUBE Foundation Piles

IN 1928 the first tapered steel Monotube foundation piles were installed on one complete bent of a Wheeling and Lake Erie Railroad trestle bridge. Recently Union Metal engineers made a thorough inspection of that first Monotube piling job. They found it in excellent condition —*ready to serve for years to come.*

Monotubes are preferred by engineers and contractors because . . .

**Monotubes are light in weight, easily and quickly handled • They are cold-rolled and fluted for extra strength • They are easily extendible, right on the job • Their sturdy construction makes it possible to eliminate use of a driving mandrel • Monotubes' tubular construction makes inspection, before concreting, quick and easy.**

Right now you may be planning bridges, highways, underpasses, buildings. Wherever foundation piling is necessary, plan on Monotubes. They give your projects the right start and a healthy future —make time and cost savings for you. Gauges, sizes and tapers to meet varying soil conditions. For complete information, write The Union Metal Manufacturing Company, Canton 5, Ohio.



**UNION METAL**

*Monotube Foundation Piles*



*For additional information, use postcard, pages 655-656*

# The Last Word

## IN RAIL JOINT PROTECTION

Workmen applying NO-OX-ID "A Special." Coating prevents corrosion and insures lubrication.

It's so easy to be certain of complete protection for rail joints. First apply NO-OX-ID "A Special" to rail ends, joint bars, track bolts. After the joint is assembled, plug open ends of bars with NO-OX-ID Joint Bar Filler. Sand and grit are excluded. Lubrication is assured because corrosion is prevented with NO-OX-ID chemical inhibitors. The entire joint assembly is sealed against brine, cinders, moisture, all corrosion accelerators. Send for descriptive circular with complete information.

Plugging bar ends with NO-OX-ID Joint Bar Filler ..."sealing in" protective benefits of NO-OX-ID rust-preventive coating and joint lubricant.

NO-OX-ID IRON OXIDE RUST

**Dearborn**
Reg. U.S. Pat. Off.

THE LEADER IN RUST PREVENTIVES AND BOILER WATER TREATMENT

**DEARBORN CHEMICAL COMPANY**

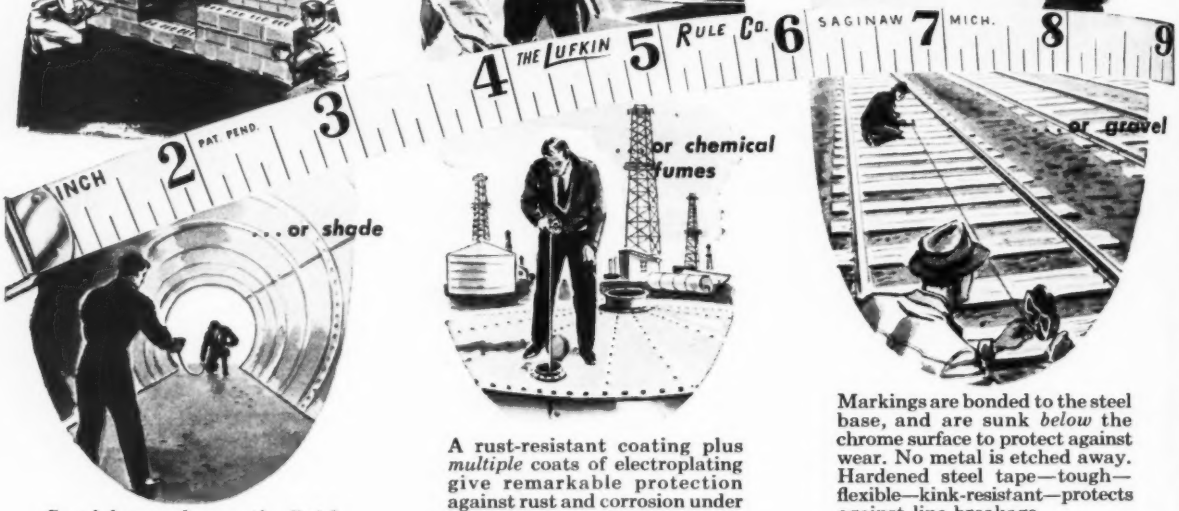
310 S. Michigan Ave., Chicago 4 • 807-15 Mateo St., Los Angeles
205 E. 42nd St., New York • 2454 Dundas St., West, Toronto

# CHROME CLAD TAPES
## do what no other tapes can do!

*Easy to read in sun...*

*Rust and corrosion resistant in tropical damp...*

*Wear-protected even against dragging on concrete...*




*...or shade*

*...or chemical fumes*

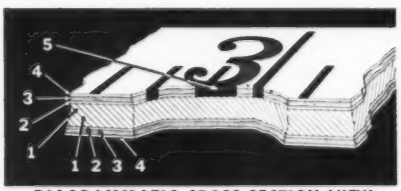
*...or gravel*

Special non-glare satin finish on heavy chrome plating that adds to toughness of the line. Durable jet-black markings stand out sharply against this light-absorbing surface. Will not crack, chip or peel.

A rust-resistant coating plus *multiple* coats of electroplating give remarkable protection against rust and corrosion under conditions no other tapes can withstand.

Markings are bonded to the steel base, and are sunk *below* the chrome surface to protect against wear. No metal is etched away. Hardened steel tape—tough—flexible—kink-resistant—protects against line breakage.

# LUFKIN CHROME CLAD STEEL TAPES




**DIAGRAMMATIC CROSS-SECTION VIEW**

**1. Hardened Steel Tape. 2. Rust-Resistant Coating. 3. Multiple Coats of Electroplating. 4. Hard, Smooth, Non-Glare Chrome-Plating. 5. Black Markings Bonded to Steel, Sunk below Surface.**

The news is spreading fast. Wherever men use steel tapes they are talking about these outstanding improvements found only in Lufkin "Chrome Clad Tapes."

Surveyors—mill men—carpenters—men everywhere who work in extremes of light and shade say "Chrome Clad Steel Tapes" mean less stooping and squinting—easier reading—less chance of errors—faster work.

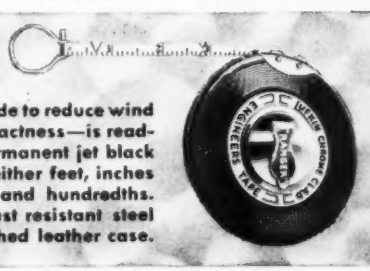
Construction and road crews marvel at the way they resist kinking and line breakage—saving valuable time and repair expense. They find the markings still sharp—easy to read—after years of rough usage.

Men of the oil fields, mines, chemical plants, and waterways state that "Chrome Clad Steel Tapes" resist rust and corrosion in dampness, fumes and sea water as no other tapes can do.

If you want the satisfaction of owning the "Outstanding Tape of Today," call for Lufkin "Chrome Clad Steel Tapes" at your dealers.

***Buy* steel tapes with easy-to-read markings that are durable**

**"RANGER" Model... Lufkin's Chrome Clad tape specially designed for engineers. The sturdy steel line—only ¼" wide to reduce wind resistance and provide compactness—is readily detachable from case. Permanent jet black markings are available in either feet, inches and eighths or feet, tenths and hundredths. Zero falls at end of line. Rust resistant steel liner protected by hand stitched leather case.**



*Buy* LUFKIN

PRECISION TOOLS • TAPES • RULES
FROM YOUR DISTRIBUTOR

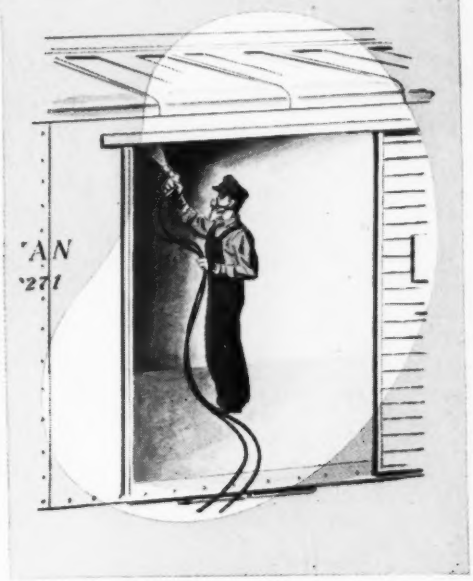
THE LUFKIN RULE CO.

Saginaw, Michigan • New York City • Windsor, Canada

# PROTECT YOUR ROLLING STOCK

# *Inside and Out* WITH FLINTKOTE RAILROAD PRODUCTS

***Get the Made-to-Order Dependability that these specialized products bring to every job they do for you.***



**IF YOU WANT THE *INSIDE* STORY** . . . get the facts on Flintkote Insulation Coatings.

Freight cars, like homes or warehouses, need thermal insulation and sure protection against condensation. Moisture on bare structural metal invites corrosion . . . condensation drip on products and equipment causes heavy losses.

Load a cold car with warm products . . . like flour, sugar, corn starch . . . haul East and West, North and South, mountains to the sea for weather extremes . . . unless you have proper protection, condensation brings trouble.

Flintkote Insulation Coatings will serve you well and meet every shop requirement on application. Cutback types for quick drying protection and easy sprayability . . . non-inflammable emulsion types in both summer and winter grades eliminate application hazards and give anti-sweat performance. All are "tops" in protection against corrosion.

**FOR *OUTSIDE* JOBS** . . . on frames, under floors and roofs, on slope and end sheets . . . protect your rolling stock with Flintkote Car Cements. These specialized products are highly resistant to water, flying cinders and gravel, resist cracking under temperature changes and they give long-life protection against corrosion . . . Flintkote standard grade or special types formulated to your own specifications.

**FLINTKOTE LINE OF RAILROAD PRODUCTS**

We'll be glad to send you complete specifications and application data on Asphalt Emulsion Protective Coatings . . . Car Cements . . . Insulation and Anti-condensation Coatings . . . Cold-laid Asphalt Mastic Flooring . . . Building Materials . . . Materials for control of water and dampness problems.

For information, call or write:

**THE FLINTKOTE COMPANY,**

**Industrial Products Division, 30 Rockefeller Plaza, N. Y. 20, N. Y.**

ATLANTA • BOSTON • CHICAGO HEIGHTS • DETROIT
LOS ANGELES • NEW ORLEANS • WASHINGTON
TORONTO • MONTREAL

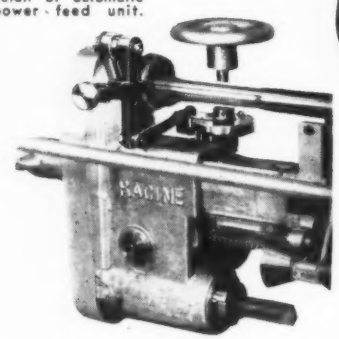
**FLINTKOTE** *Products for Industry*

FLINTKOTE INDUSTRIAL PRODUCTS

# Light-Powerful RACINE Portable Rail Drill

*with* **AUTOMATIC POWER FEED**

Detail of automatic power-feed unit.




This powerful, compact, precision built horizontal type drill is designed to simplify and speed up rail drilling in track and rail maintenance repair work. Because of its light weight, roller mounted design, this new rail drill can be handled by just one man. Speeds up drilling operations and reduces man-hour costs.

## CONSTRUCTION AND OPERATING FEATURES

★ Powered by a 2½ H.P. 4 cycle gasoline engine connected to drill chuck through a 30 to 1 reduction gear. Adequate power for drilling holes through any rail web in less than two minutes. Engine has built-in high tension fly wheel magneto that insures quick easy starting.

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★ Drill bit is protected by automatic release feature of the feed unit. Quick-acting drill holder provides ease in changing drills.

★ Easy to handle. Carrier guard protects operating mechanism and provides a means for lifting machine onto track cars or quick removal from rail in cases of emergency. Total weight less than 165 lbs.

★ A single adjustable carrier places the traction wheels of drill in contact with rail. Can be easily rolled from one joint to the next without lifting from rail.

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*Write for your copy of our new 711 Railway Maintenance Machines Catalog. Address Racine Tool and Machine Co., 1738 State St., Racine, Wis.*

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*For additional information, use postcard, pages 655-656*

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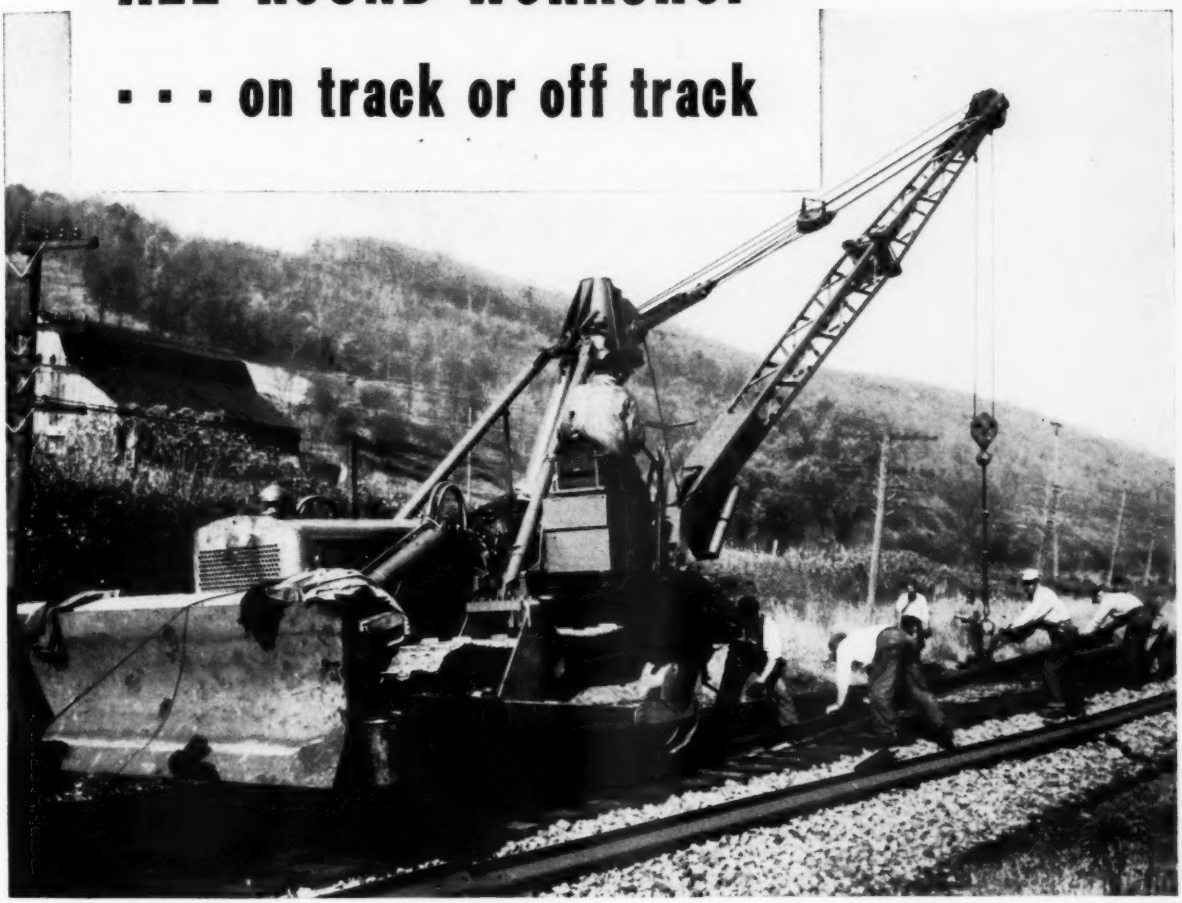
## . . . on track or off track



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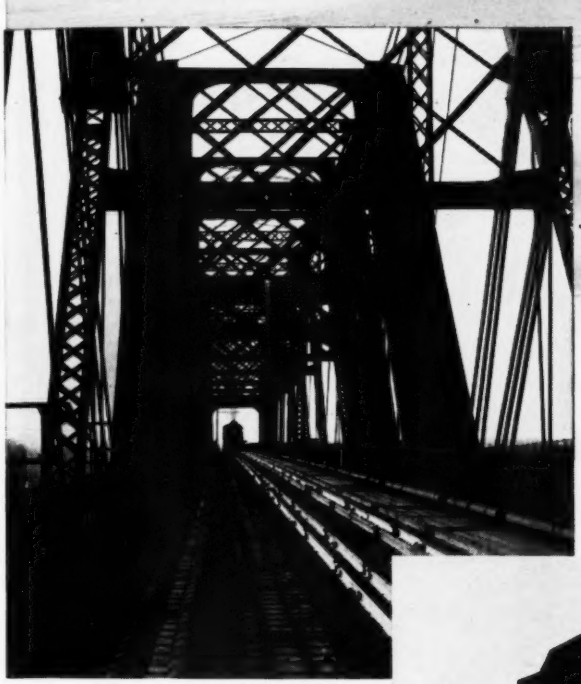

Two views of the Frisco Railroad's bridge at Memphis, Tenn., soon after it had been painted with Pittsburgh IRONHIDE.

## *Pittsburgh's tough, durable Railway Finishes are designed to safeguard costly properties against rust and corrosion*

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31

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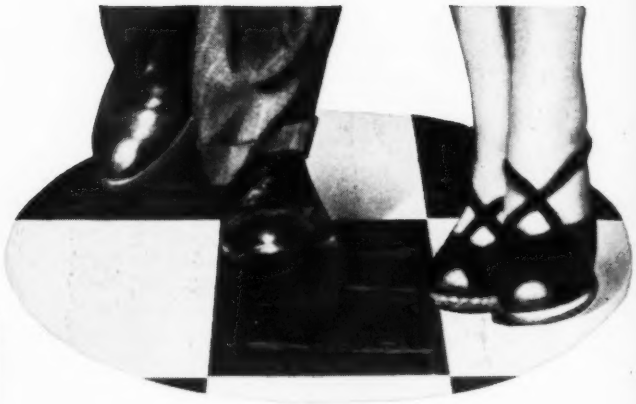
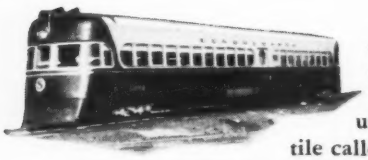
# TROD ON BY 400,000 PASSENGERS...



**Close-up** of new Terraflex floor tile used in streamlined passenger motor car of New York, Susquehanna and Western Railroad shows little scuffing or wear after approximately 16,000 passengers a month used it for 26 months.

## Terraflex, the new J-M plastic asbestos floor tile won't give up!



Here is the ideal decorative flooring for all railroad use! It is a plastic asbestos tile called TERRAFLEX—an entirely new type floor covering pioneered and developed by Johns-Manville.

Installed in the car above, Terraflex shows no signs of giving up after 26 months of service. During this time, some 400,000 people trod this car's aisles—based on counts from passenger train performance reports of the railroad.

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**91 YEARS OF SERVICE TO TRANSPORTATION**

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*On Any of the Products Mentioned in This Issue*

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

## Products Index


A

Adzing Machines ..... 659
Air Compressors ..... 624, 627, 697
Anchors, Rail ..... 621, 626, 650, 657, 693
Asphalt ..... 716
Asphalt Flooring ..... 647
Axes ..... 626

B

Ballast Forks ..... 626
Belt Carriers ..... 713
Blowers ..... 630
Boilers ..... 706
Bolt Tighteners ..... 636, 661
Bridge Jacks ..... 628
Brushes ..... 651
Building Materials ..... 647

C

Car Movers ..... 714
Car Stops ..... 712, 714
Chain Saws ..... 663
Chemical Sprayers ..... 636, 662
Chemical Weed Killers ..... 699
Chemicals ..... 651
Clamshells ..... 629, 632, 709
Conveyor Belt Carriers ..... 713
Cranes ..... 625, 629, 632, 652, 707, 709, 710
Crawler Compressors ..... 697
Crawler Cranes ..... 625, 632
Crawler Shovels ..... 625
Crawler Tractors ..... 643
Creosote Sprayers ..... 636
Cribbing Machines ..... 638, 639, 659
Crossings ..... 664

D

Derails ..... 714
Diesel Engines ..... 624, 643, 649
Diesel Locomotive Cranes ..... 629, 652
Draglines ..... 625, 632, 709
Drills ..... 624, 648, 659, 705, 712, 714
Drinking Fountains ..... 713
Drive Spikes ..... 700

E

Earthmoving Equipment ..... 643, 649, 701
Electric Saws ..... 624
Electric Tampers ..... 634, 635
Electric Tools ..... 624
Emulsified Asphalt ..... 716
Engines ..... 624, 643, 649, 694, 709
Eye Protectors ..... 710

F

Fence Tighteners ..... 641, 691
Fire Retardant Wood ..... 642
Floor Plates ..... 703
Floor Tile ..... 654
Flooring ..... 654
Foundation Piles ..... 644
Fountains ..... 713

G

Gasoline Engines ..... 709
Gauges ..... 714
Generators ..... 630, 692
Glass ..... 651
Goggles ..... 710
Grading Machinery ..... 701
Grouting ..... 716
Guard Rails ..... 664

H

Hammers ..... 626, 694
Hatchets ..... 626
Hook Bolts ..... 713

I

Impactors ..... 708, 712
Insulation Coatings ..... 647

J

Jack Supports ..... 704
Jacks ..... 628, 659, 704
Joint Bar Fillers ..... 645

L

Locomotive Cranes ..... 629, 652, 710





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M

Magnets ..... 709
Measuring Tapes ..... 646, 692
Metal Piles ..... 644
Meters ..... 710
Motor Cars ..... 662
Motor Graders ..... 649

O

On-Track Tampers ..... 634, 635
Ore Bridges ..... 629

P

Pads ..... 658, 695, 710
Paint ..... 651
Paving Impactors ..... 708, 712
Piles ..... 644
Pipe Cleaning ..... 702
Plastics ..... 651
Plate Spacers ..... 636
Pneumatic Tampers ..... 627
Portable Grinders ..... 630
Power Ballasters ..... 638, 639
Power Jacks ..... 659
Power Units ..... 643
Precision Tools ..... 646
Prefabricated Buildings ..... 637
Pressure Treated Wood ..... 642
Pullshovels ..... 625
Pumps ..... 624, 630, 692, 713

R

Rail Anchors ..... 621, 626, 650, 657, 693
Rail Benders ..... 714
Rail Braces ..... 664
Rail Drills ..... 648, 659, 705
Rail Expanders ..... 704
Rail Forks ..... 626
Rail Grinders ..... 659
Rail Joint Oilers ..... 636
Rail Joint Shims ..... 626
Rail Lubricators ..... 664
Reconditioning Water Mains ..612
Rock Drills ..... 624
Roller Bearings ..... 631
Rollers, Portable ..... 708, 712
Roofing ..... 710
Rotary Pumps ..... 713
Rules ..... 646
Rust Preventives ..... 645

S

Safety Spectacles ..... 710
Saws ..... 624, 633
Scoops ..... 626, 701
Scuffle Hoes ..... 626
Scythes ..... 626
Sewer Systems ..... 702
Shovels ..... 625, 632, 707, 709
Spike Hammers ..... 659
Spike Pullers ..... 659
Spikes ..... 700
Spot Boards ..... 714
Sprayers ..... 662
Spring Washers 622, 650, 705, 715
Steam Generators ..... 706
Steel Buildings ..... 637
Steel Crossings ..... 664
Switch Point Locks ..... 664
Switch Points ..... 664
Switch Rods ..... 664
Switch Stands ..... 623, 664

T

Tampers ..... 627, 634, 635, 653
Tamping Guns ..... 627
Tapes ..... 646, 692
Tie Borers ..... 661
Tie Cutters ..... 636
Tie Pads ..... 658, 695, 710
Tie Scorers ..... 636
Tie Tongs ..... 714
Timber Saws ..... 624
Track Drills ..... 705
Track Jacks ..... 704
Track Levels ..... 714
Track Shifters ..... 656
Track Shovels ..... 626
Track Wrenches ..... 659
Tractors ..... 643, 649, 691, 710
Trench Hoes ..... 632, 709
Truck Cranes ..... 632, 707, 709
Truck Shovels ..... 707

U

Unit Tampers ..... 653

V

Vacuum Pumps ..... 624

W

Washers, Spring ..... 622, 650, 705, 715
Water Control ..... 702
Water Service ..... 702
Water Surveys ..... 702
Waterproofing ..... 647
Weed Burners ..... 636
Weed Cutters ..... 636
Weed Killers ..... 694, 699
Weed Killing Service ..... 699
Welding ..... 710
Wheel Tractors ..... 643
Wood Preservation ..... 642
Wrecking Cranes ..... 629



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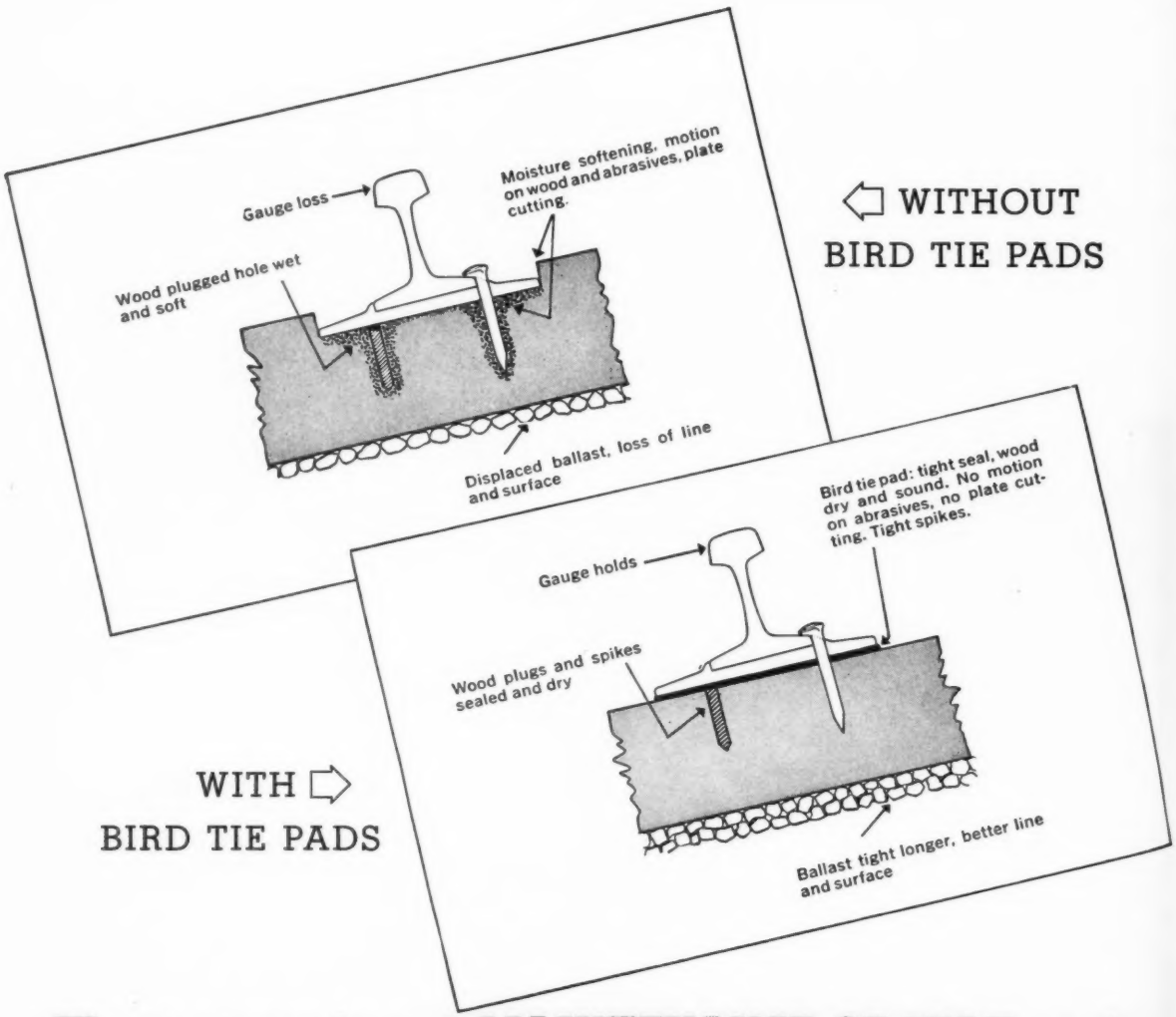
Gauge loss
Moisture softening, motion on wood and abrasives, plate cutting.
Wood plugged hole wet and soft
Displaced ballast, loss of line and surface
WITHOUT BIRD TIE PADS
Bird tie pad: tight seal, wood dry and sound. No motion on abrasives, no plate cutting. Tight spikes.
Gauge holds
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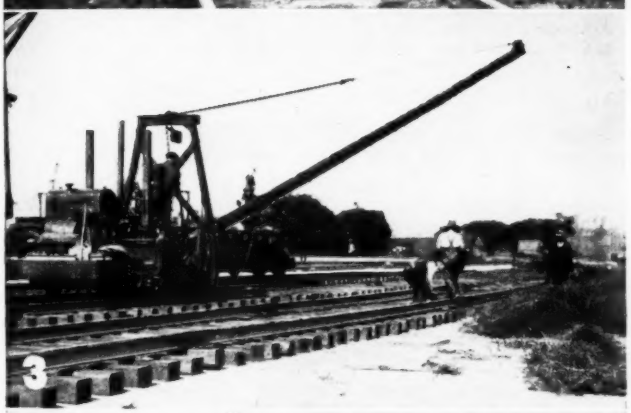


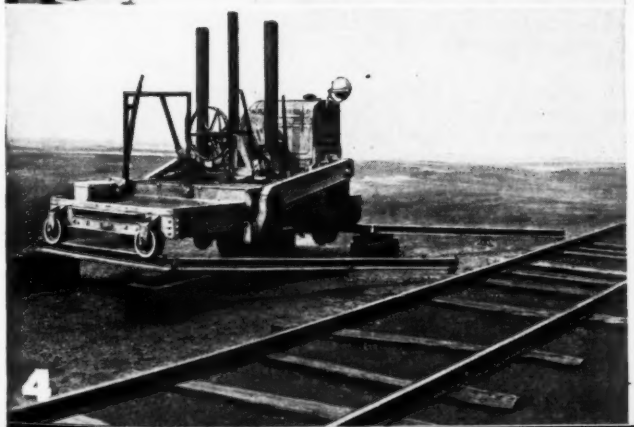


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**1** **A heavy lift in soft, sticky clay.**

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**3** **Converted to a light crane for handling rail and other material constructing a new yard.**

**4** **Off the track, clear of traffic.**

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**Subject:** Our New Headquarters

July 1, 1949

Dear Readers:

Railway Engineering and Maintenance comes to you this month from new headquarters in Chicago. Along with the Chicago office of Railway Age and our other railway publications–Railway Mechanical Engineer, Railway Signaling and Communications, and Railway Engineering and Maintenance Cyclopedia–we moved during the past month to new, well-laid-out spacious quarters in the 79 W. Monroe Street building–corner of Clark and Monroe–even closer to the business heart of Chicago, and convenient to every railway office and station in the city.

After being located at 105 W. Adams street for 22 years, and more than doubling our personnel and space requirements within that period, moving the company's Chicago properties to new headquarters was no simple task, especially while keeping all of our publications going without a hitch. In fact, it was a big task, a disrupting task, and one not to be looked forward to at frequent intervals–but it had one satisfying sidelight, that afforded much compensation.

I refer to the housecleaning and thinning-out of files–both personal and publication–that went with the move, which afforded to some of us a virtual panorama of many past years of railway construction and maintenance–and of publishing–and of outstanding personalities that have been connected therewith.

Bent over swollen files for hours on end, my attention was brought to a hundred or more jobs and projects–large and small–that I have witnessed and have been privileged to describe in our pages; to literally hundreds of names in the engineering, roadway and structures departments of the railroads all over the United States and Canada, who have become collaborators and close friends over the years; and not the least, to the years of association with former outstanding men on our own staff, including Elmer Howson and George Boyd, who have passed on, and Walter Lacher, who left us in 1938 to become secretary of the American Railway Engineering Association.

Sometimes it's good to look back; to stop long enough to view the present in retrospect; to meditate on present and past friendships, incidents, successes and failures. Certainly, moving, with its attendant housecleaning, afforded all of this–to some extent to each member of our staff–and I am sure with great satisfaction and benefit.

At the same time, cleaning out brought with it a feeling of making a new start, a desire to press forward to new accomplishments and service–which I am sure will be reflected in Railway Engineering and Maintenance as it comes to you monthly from our new headquarters.

Sincerely,

Neal D. Howard

NDH:ag

Editor

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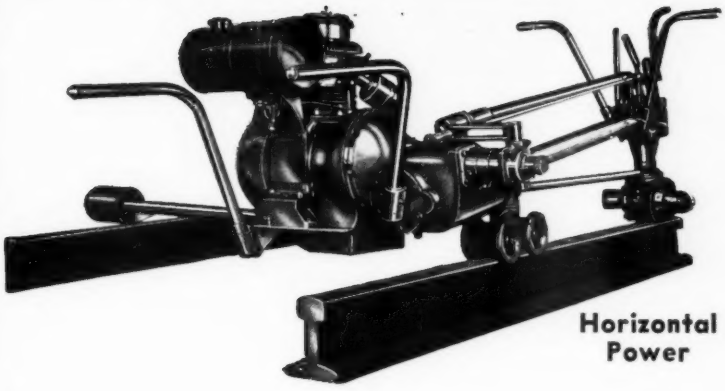

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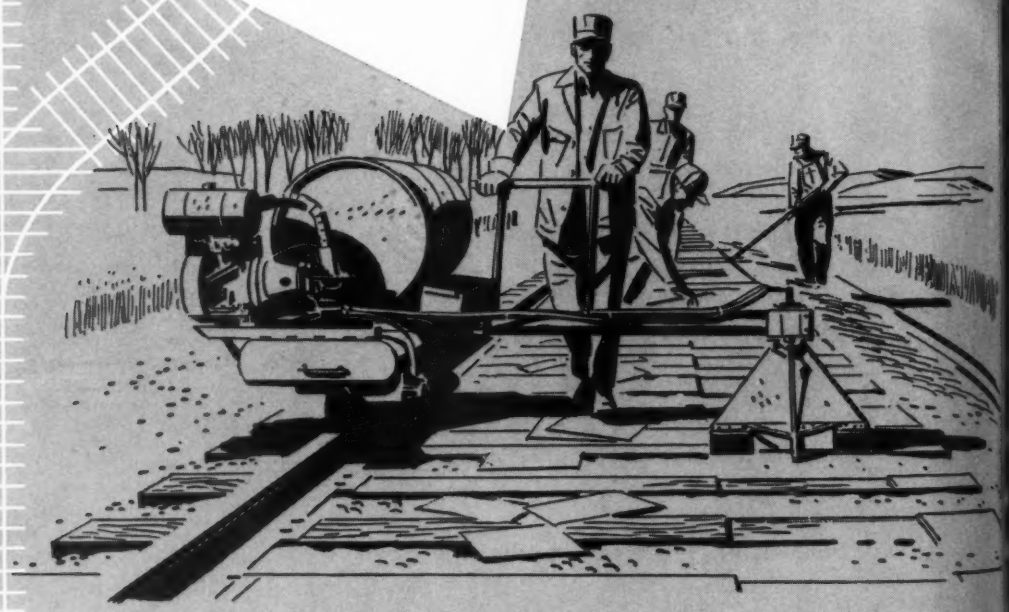
# sprays ties

**automatically and rapidly**



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VOL. 45, NO. 7 JULY, 1949

**Editorials** - - -

# Racor Security RAIL BRACES

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# Truck Competition—

## *A Destroyer of Public Property and Railroad Jobs*

As Mr. John Q. Public drives over the thousands of miles of truck-crowded, broken-down highways of the country, he should burn with indignation at a form of commercial transportation that is bringing about this condition of the highways, largely at his expense. Railroad employees, in particular, both individually and collectively, should literally "burn up," knowing that they are not only being taxed unjustly—as part of the common public—to offset this destruction, but that the destruction is being caused by a competitor of their industry which is jeopardizing their very livelihood. And, being "burned up," they should speak out unceasingly until the situation has been corrected.

Many people today, including railroad employees, speak lightly of the "trucks getting more business." The truth is, as pointed out by the Wall Street Journal recently, "What they're actually witnessing is a minor revolution in the movement of freight." Largely as the result of being subsidized from the taxpayers' pockets, which has enabled them to undercut railroad freight rates, the number of Class I (annual revenue of $100,000 or more) interstate truckers in the country has more than doubled since just before the war; their revenues have about quadrupled; and daily they extend their inroads further into that part of the traffic of the country which rightly and economically should be held by the railroads.

That this growth of over-the-road commercial trucking is largely responsible for the alarming destruction of the major highways of the country is beyond dispute—protestations of the trucking interests to the contrary, notwithstanding. Aroused by this situation, several influential individuals and groups have spoken out in recent weeks against the abuse of these public, tax-built and supported facilities by heavy commercial trucks. Prominently among those so aroused is R. J. Schmunk, president of the American Automobile Association, who, in February last, said that thousands of miles of the country's most important roads are being prematurely damaged by the increasing use of heavy commercial vehicles. When his statement was challenged by the managing director of the American Trucking Association, Mr. Schmunk said, "We repeat that thousands of miles (of roads) and billions of dollars are in jeopardy," and went on to back up his original contention with testimony from a number of highway specialists of undisputed reputation, including Thomas H. MacDonald, chief of the U. S. Public Roads Administration, and several state highway department heads.

Coupled with this charge against heavy commercial trucks is a rising tide of protest in the various states against the disregard of many truckers for legal load limits; the added hazards to safety presented by trucks on the highways, not only by their size, number and speed of operation, but because some of them are underpowered and underbraked for the loads they carry; and the higher cost to the taxpayer of new highways to carry heavy truck traffic. G. T. McCoy, chief engineer of the California Division of Highways, for example, has estimated that the heavy vehicles in his state are responsible for 55 per cent of the total cost of new highway construction.

But of still greater concern to railroad employees is the fact that railroaders' jobs are being jeopardized or destroyed by this highway competition—competition which is triving only because, aided by taxpayers' money, it has been able to undercut railroad freight rates that are based necessarily on the full cost of the service rendered. Furthermore, because they are less stringently regulated, commercial truckers are selecting

the cream of the traffic available, leaving to the railroads the lower-rated commodities—which they must accept as common carriers—thereby still further reducing railroad revenues.

There should be nothing academic about the relationship between railroad traffic, railroad revenues and railroad employment to the railroad man. He has witnessed force reductions too many times over the years not to realize that jobs on the railroads depend upon traffic and earnings. But he should not lose sight of the fact that force reductions are brought about not only by strikes and other serious work stoppages, but just as positively, though less dramatically, by attrition—the gradual loss of railroad traffic to subsidized competition, including trucks.

It should be a bitter pill for railroad men to know that they, personally, through taxes on themselves and their industry, are helping to make possible this unfair competition—competition that has already cost many railroad jobs, and is seriously threatening many more. This should be a pill so bitter as to arouse them—as citizens—to fight unceasingly against the continued subsidization of the trucking industry, and its destruction of the highways at public expense.

## SYSTEMATIC EFFORT—

### *Needed to Assure Progress in Maintenance*

HOW CAN maintenance officers be certain that their practices are being kept up to date and that progress is being made from year to year in furthering the efficiency and effectiveness of the forces working under them? The answer to this question may not be as simple as it may appear to be on the surface.

In the early days of railroading it was not uncommon for one man to be an authority on all phases of railroad engineering and maintenance, but the passing years have brought such a vast accumulation of available knowledge, that it is practically impossible for a single individual to acquire a detailed comprehension of past and present developments in all branches of the field. The result, necessarily, has been a marked tendency toward specialization—in bridges, in track, in welding, in ties and wood preservation, in machinery, and in other directions. To some extent reliance can be placed on the specialists to keep a railroad's practices abreast of the times, but the difficulty here is that the working hours of the specialists are usually so crowded with immediate problems and responsibilities that they are seldom in a position to make careful objective appraisals of all the developments in their particular fields.

If a railroad desires to be assured of keeping up with the world in a technological sense, it must make a conscious, systematic attempt to do so, placing definite responsibility on specific individuals for investigating and reporting on particular subjects or fields and assuring these men adequate time for this work. A number of railroads are using with success a plan that involves the appointment of committees to make such investigations and reports. In some cases the roster of committees of the American Railway Engineering Association is used as a pattern for assignments to these groups, but the details of organization are of little importance as long as an effective type of organized effort is made in the right direction.

If such a plan is to be of maximum effectiveness its objectives should involve much more than merely reporting new developments. Not only must there be an effort to integrate these developments into the practices of the particular road, but goals in improved performance must be established and a concerted effort made to attain them. Only in this way can consistent, year-to-year progress be assured.

## ALL MUST HELP—

### *In Solving Problems of the 40-Hr. Week*

IN LESS than two months the 40-hr. week will go into effect for the maintenance-of-way and structures forces. If these forces are going to be prepared to cope with this revolutionary change at the time it occurs they have only these two months of grace in which to make their preparations. One way to insure that these preparations will proceed smoothly and swiftly toward the formulation of a workable and satisfactory plan is for each man in the department—from engineer maintenance of way to trackman—to ask himself if he has accepted and is discharging his share of the responsibility in helping to solve the problems involved.

Only a little thought is needed to develop the nature and extent of the responsibility of each individual. Basically this responsibility stems from a common origin—the necessity of improving the efficiency of the maintenance forces with the objective of minimizing the additional cost of the shorter work-week. To achieve this objective is in the interests of all concerned. For those with supervisory responsibility it means personal satisfaction and increased prestige—for those in the ranks it means the peace of mind that goes with job security.

Specifically, what are the responsibilities of various individuals in the furtherance of plans for coping with the 40-hr. week? For maintenance officers in the upper brackets this responsibility means not only taking the initiative in determining what is to be done, but also convincing management that important changes and possibly certain expenditures, such as for more machines and additional supervision, will be necessary if the most desirable and economical solution is to be achieved. The personal responsibility of supervisory officers out on the line, including foremen, is to make a definite contribution, in the form of ideas and suggestions, to the general effort, avoiding the tendency to assume that this is a problem for somebody else to worry about. Men in the ranks can also extend invaluable aid in solving the problem if they will resolve to produce as much work in five days as they formerly did in six.

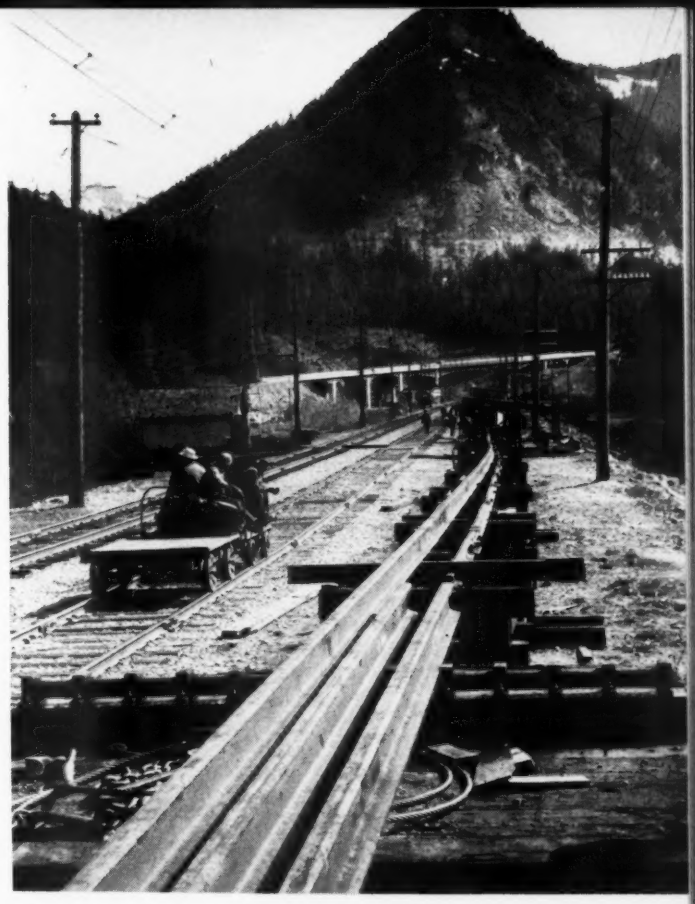
To the extent that each individual in the maintenance department fails to acquire a clear-cut conception of his role in planning for the five-day week, and to accept the responsibility that goes with that role—to that extent will the railroads fail in finding and putting into effect the most effective measures for dealing with it.

# Longest Tunnel Gets Welded Rail

*This month the Great Northern will wind up the biggest continuous-rail project yet undertaken in the Pacific Northwest — the installation of four track miles of new 115-lb. pressure-welded rail in the east half of the Cascade tunnel, 98 mi. east of Seattle, Wash. This article describes the project in detail, telling how the rail is being welded, tested to detect any possible flaws in the new welds, coated with a preservative and laid.*

• Anticipating smoother-riding track and reduced maintenance costs, the Great Northern this month will complete the relaying of four track miles of 110-lb. jointed rail in its 7.79-mi. Cascade tunnel, located 98 mi. east of Seattle, Wash., with new 115-lb. continuous-welded rail. Using a pressure-welding machine leased from the Oxweld Railroad Service Company, the road is fabricating standard 39-ft. rails into 1,326-ft. lengths at Scenic, Wash., near the west portal of the tunnel, transporting the long rails through the tunnel, three at a time, on roller-equipped flat cars, and relaying them westward from the east portal at Berne, Wash. The closure joints between the long rails are being hand welded. Estimated to cost $189,000, the project is the biggest one of its kind yet undertaken in the Pacific Northwest. The work was started on May 16. The road expects to install welded rail in the remainder of the tunnel next year.

The welding equipment is located about ½ mi. west of the west portal of the tunnel. As in the usual Ox-



**Above—Loading one of the 1326-ft. welded rails onto roller-equipped flat cars. Below—In this machine the new welds are reheated to relieve stresses produced by the pressure welding**

**Below—Testing a weld with a magnet and Magna Flux powder**

weld "assembly-line" set-up, the welding plant includes, in order, a rail saw by means of which the ends of the 39-ft. rails are squared up and smoothed; the pressure welding machine; a station where excess metal is trimmed from the weld by an oxyacetylene torch; the normalizer, where the weld is reheated to relieve stresses produced in the metal by the pressure-welding; the first two of a series of three grinding and polishing machines; a power winch which utilizes a rail clamp and steel cable to move the welded rail along the assembly line; and the final grinding station where the welds are polished.

Before each weld is accepted as satisfactory it is tested for hidden flaws. This is done after the polishing operation by first setting up a magnetic field in the joint by means of an electro-magnetic unit and then dusting it with Magna-Flux powder. The pattern assumed by the powder reveals possible flaws in the weld or gives evidence of seams not ground out.

In the next step each long rail is flame cleaned to loosen mill scale from the entire surface of the rail, except the running surface of the ball and the underside of the base. The machine used in this operation has a multiple-jet head that permits an oxyacetylene flame to be directed at both sides of the rail at the same time. Then, after a final wire brushing (with hand-operated steel brushes) to remove the loosened scale, the rail is given the first of two coats of corrosion-resistant paint. This coat is applied with paint brushes to the flame-cleaned surfaces of the rail, i.e., to all except the running surface of the ball and the underside of the base. The second coat of preservative is sprayed on the rails after they are loaded on the flat cars, allowing sufficient time for drying between application of the first and second coats.

### Rails Hauled Through Tunnel

The flat cars (25 of them) on which the long rails are transported are each equipped with sufficient individual rollers to handle 12 rails abreast. So far, however, only three rails have been moved at one time because of the limitations imposed on the work by train movements in the single-track tunnel. For the first rails laid—at the east portal of the tunnel—the haul was about 8½ mi. As the relaying progresses westward, the length of the haul, of course, diminishes.

In unloading one of the quarter-mile lengths of rail, a clamp first is attached to the rail end and secured to the track by a steel cable and rail shackle. The string of flat cars is then slowly pulled from underneath the rail.

Prior to the relaying work the old single-shoulder 7½-in. by 10½-in. tie plates were replaced with new 8½-in. by 12-in. double-shoulder tie plates. This was possible because the base width of the new rail is the same as that of the old.

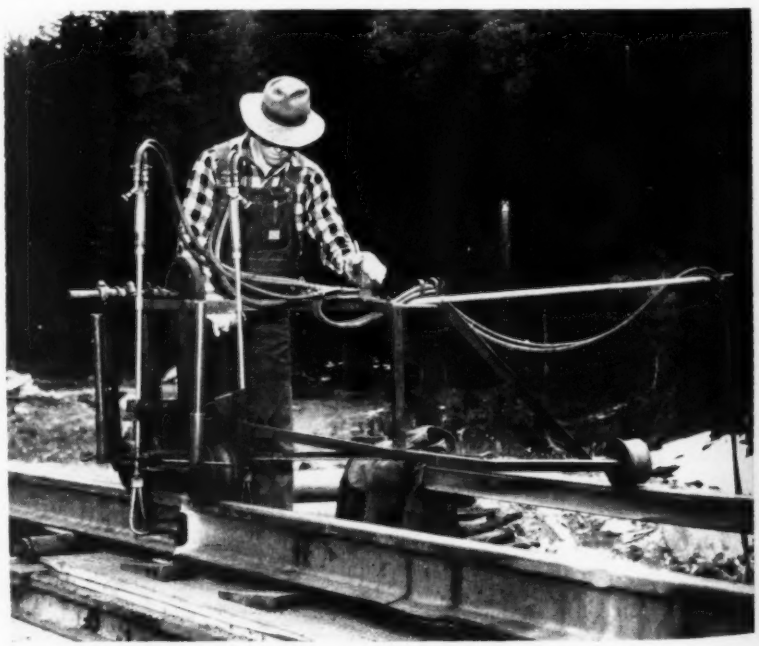
In carrying out the relay work the old rail is disconnected, using a power wrench, the inside spikes only are withdrawn, the old rail is thrown out to the side by lining bars, the new rail lined into place, and the inside spikes reset. Because of the remarkably good condition of the tie-plate seats no tie adzing has been necessary. All that is required is to clean away dirt, grease and other foreign material. This is done by hand adzes and stiff brooms. No crane has been used or required in setting out the old rail or in lining in the new.

In unloading the welded rail an effort is made to spot the rail as nearly as possible in position for relaying without longitudinal shifting. When necessary, however, a quarter-mile length of rail can be readily moved several feet in either direction by bumping to get it into the proper position.

When two consecutive long rails have been laid and it is necessary to close up for the passage of trains before the joint can be hand welded, angle bars are temporarily secured to the joint by special clamps. These clamps are C-shaped, passing under the base of the rail and securing the angle bars by one-inch stud screws. In making temporary closures of the new rail with the old, the old rail is cut with a power saw and the remaining length is turned end for end. By so doing both the joint of the old rail with the new and the next joint of the old rail can be secured by angle bars bolted at one end, and no rail drilling is necessary. In the entire four miles of relay territory there are only four insulated joints. At these locations the new rail will be cut by a power saw, drilled for bolts, and insulated joints applied.

The new rail is secured by four cut spikes for each tie plate. Two of these are gage spikes and two are hold-down spikes driven in outside holes of the tie plate. The long rails are anchored by 48 grip-type anchors in each 39-ft. panel. For each rail these are applied two against each face of every other tie, thus providing anchorage in both directions.

The rail gang (about 40 men) is transported into the tunnel from the west portal on motor cars and trailers. After unloading the men at the work site this equipment is taken to the east portal and set off the track until again required. In the tunnel there are "man-holes"



After welding, the rails are flame cleaned and given two coats of preservative

spaced 1,000 ft. apart, each of which will accommodate 25 to 30 men, and these are used when it is necessary for the gang to clear for passing trains. While not ordinarily lighted, the tunnel is provided with 110-volt electric outlets about every 1,000 ft. To light the tunnel for the relay work light cords with 100-watt lamps every 50 ft. have been connected to the outlets and strung along one wall of the tunnel. These strings of lamps are long enough to light a two-mile working stretch and are moved along as the work progresses. For close work, this lighting is supplemented by 200-watt floodlights which can be plugged into the cords.

The time consumed by the work train in hauling and unloading three quarter-mile lengths of rail is about 2 to 2½ hr. About the same amount of time is required to hand weld a joint, normalize it and give it the Magna-Flux test. The time required for the gang to relay a quarter-mile length of rail and to take care of necessary tie spacing is about two hours.

The continuous rail project is being carried out by Great Northern personnel under the general direction of H. J. Seyton, chief engineer. L. J. Gilmore, general roadmaster, has direct supervision over the work, assisted by Henri Ferryman, division roadmaster, and Adolph Holm, district roadmaster. The welding gang foreman is Harold Rich.

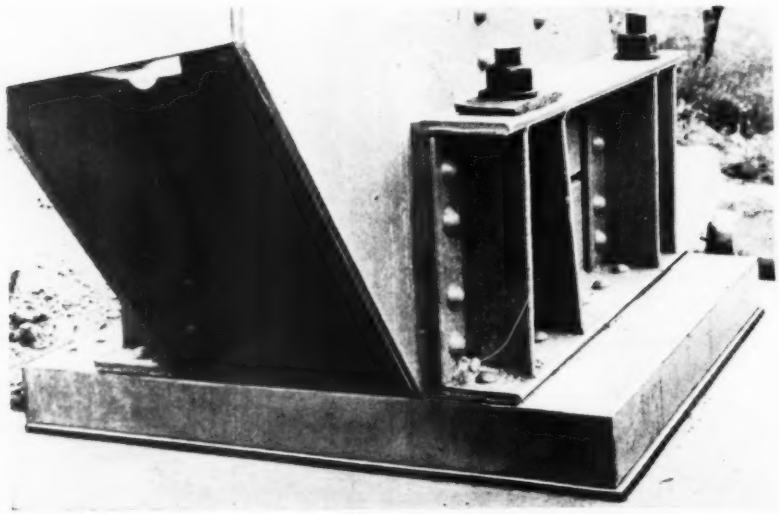
**Loaded flat cars entering west portal of the Cascade tunnel. Only three rails are moved at one time because of limitations imposed on the work by train movements**

**The flat cars are slowly pulled from underneath the rail after the rail end has been secured to the track by a steel cable**

*The Chesapeake & Ohio has recently adopted the practice of installing Fabreeka pads—similar in construction to those frequently used under special trackwork—beneath the masonry plates of its new bridges, the purpose being to obtain even distribution of the load, absorb impact, and reduce the wearing of the masonry comprising the bridge seats. A number of recently-built structures have been equipped with the pads, the most noteworthy being two high viaducts on a new branch line leading to coal mines in eastern Kentucky.*

# Fabric Pads Protect

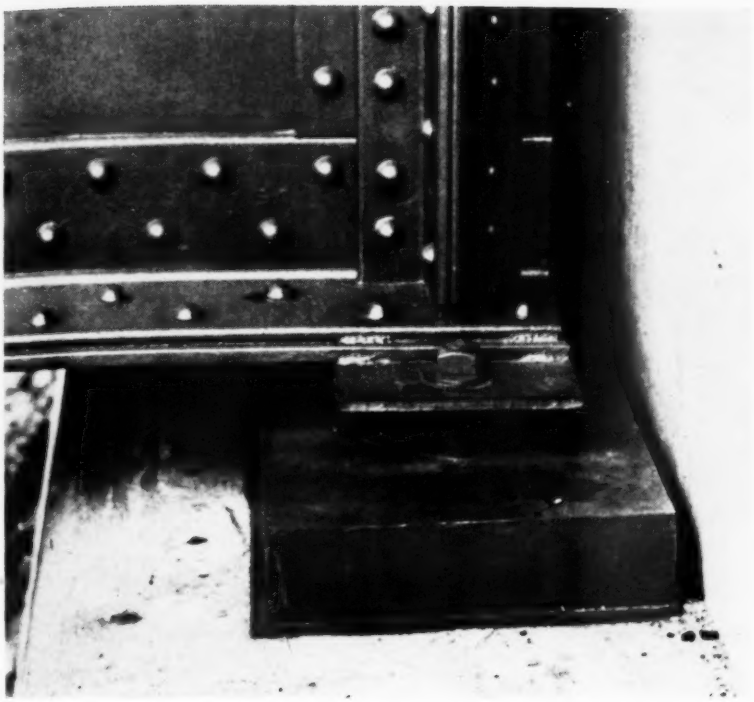
Above—Chesapeake & Ohio viaduct over Arnold Fork, near Kite, Ky., one of two new structures with Fabreeka pads inserted between the masonry plates and the top surfaces of the tower pedestals and the bridge seats. Below—A Fabreeka pad 41 in. square on one of the tower pedestals of the new West Fork viaduct



• For the past several years the Chesapeake & Ohio has had under way an intensive program involving the construction of new branch lines to open up hitherto undeveloped coal resources in eastern Kentucky and in West Virginia. Because of the rugged character of the terrain in this section, the program has called for the construction of a number of bridges to cross the numerous mountain streams and, in at least two instances, has required the building of long viaducts to cross ravines at high level.

An interesting feature of the bridges is the use of fabric pads as load-bearing cushions between their masonry bearing plates and the bridge seats on both piers and abutments. This material has also been used in a similar manner beneath the pedestal plates of the viaduct towers.

The viaducts referred to are on the Wayland extension of the Elkhorn & Beaver Valley sub-division, which was placed in service last September. This line extends south from Wayland, Ky., to a new coal mine that is expected to produce 2,000,000 tons per year. One of the



**The bridge seat of the west abutment of the Arnold Ford viaduct, showing a pad 19 in. by 39 in. by ½ in. installed underneath the masonry plate**

# Bridge Support Masonry

viaducts—crossing a stream known as West Fork, near Kite, Ky.—is 176 ft. high and 848 ft. long and is the highest structure on the C. & O. The second viaduct, also near Kite, crosses Arnold Fork and is 156 ft. high and 700 ft. long.

The designs of the two viaducts are almost identical. Each, in general, embodies 100-ft. deck-girder spans, alternating with 50-ft. tower spans. Each tower is supported on four concrete pedestals arranged in the form of a square.

The pads used in the work are known as Fabreeka pads, being furnished by the Fabreeka Products Company, Boston, Mass., and are identical with the pads that have been in use for some years beneath the tie plates at special trackwork installations, at turntables, and on bridge and elevated structures. The pads are made of multiple layers of a specially designed hard-woven duck, each layer being 1/64 in. thick, thoroughly impregnated with rubber and cured under heat and pressure. The resulting pad is ½ in. thick and is said to possess unusual strength and to have limited permanent "set."

In the earlier uses of the pads, the principal considerations have been the absorption of impact and to reduce noise, wear at the joints, and mechanical wear of ties.

The use of the pads at the new bridges and viaducts on the C. & O. has as its primary purpose the even distribution of the dead and live load over the entire bearing area. This even distribution is obtained because the pads compress under load and adjust themselves to any irregularities in the masonry surfaces or in the bearing plates.

Another important consideration is that the pads absorb much of the vibration that develops as trains pass over the structures and eliminate the abrasive action that would develop otherwise between the masonry plates and the bridge seat, with wear of the surface of the seat. It is also expected that the pads will retard surface deterioration of the bridge-seat concrete due to weathering.

The use of the pads at the abutments of the long viaducts on the Wayland extension is typical of the bridge seat installations at other points on the C. & O. The masonry plates involved are 4 in. thick and are 18 in. by 38 in. in plan. The Fabreeka pads used in this case are ½ in. thick and are 19 in. by 39 in. in plan, being ½ in. longer in each direction than the plates. The pads were installed just before the steel was erected, having been punched in advance to accommodate the anchor belts.

A similar design was followed on the pedestals of the viaduct towers. Here, the pedestal plates are 40 in. square and 4 in. thick. The pads used are 41 in. square and ½ in. thick.

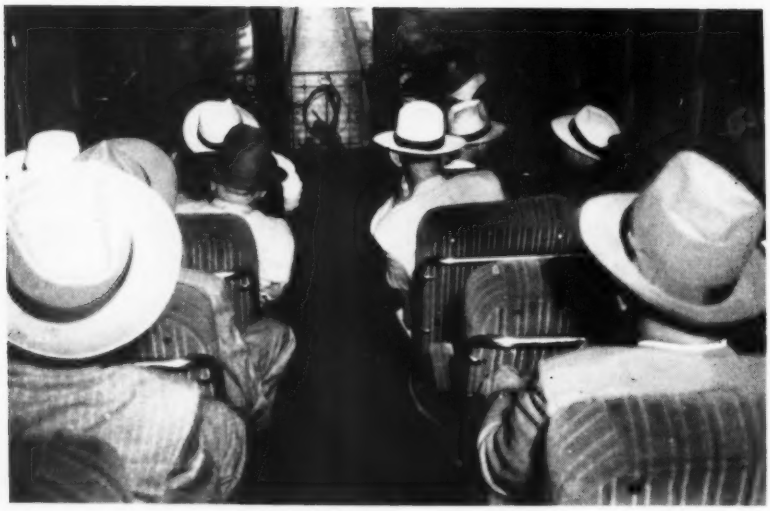
The dead load on each pedestal is calculated at 95 p.s.i. When a loaded train passes over the viaducts, the resulting load is 650 p.s.i—an increase of 555 p.s.i.—all of which is transmitted through the pads to the masonry.

### Now a Standard Practice

The use of Fabreeka pads for this purpose has not been confined to the new coal-mine branches referred to. They have also been used when reconstructing bridges at other points on the road. In all, nearly 50 bridges have been fitted with the pads during the past two years. In spite of this rather extended use of the pads, the C. & O. considers their use still of a trial nature, pointing out that the pads have been in service much too short a period to constitute an adequate service test.

However, the use of the material has now been adopted as standard practice for all new construction. Thus, pads will be used on a number of projects in the near future, the most notable being a 2¾-mi. viaduct at Richmond, Va., to replace a 49-year old structure that has reached the limit of its economical service life. The construction of the new viaduct is scheduled to begin this year.

Bridge construction on the C. & O. is carried out under the general direction of L. T. Nuckols, chief engineer, C. B. Porter, assistant chief engineer-construction, and C. H. Chapin, bridge engineer, all with headquarters at Richmond, Va. The installations of Fabreeka pads on the bridges of the Wayland extension were made under the direct supervision of G. R. Jenkins, district engineer, Pikeville, Ky.



# A Day With the C

By "ON-THE-JOB" JOE
Special-Assignment Editor

The ramped observation end of the Gyro car, with its double row of upholstered seats, provides a full view of the track at all times for 20 men

• Memphis, Tenn.—May 19—Today six more track supervisors and thirty-three more track foremen will be on the "hot seat"—and I don't mean the bleachers at the ball park—although some "batting averages" are certain to change for better or for worse, and there may be a "home run" or two, and possibly a few "strikeouts."

We're starting out the tenth day of the Louisville & Nashville's spring track inspection, employing the Chesapeake & Ohio's Gyro Track Recorder Car, which is operated by Sperry Rail Service on roads other than the Chessie. More than 300 miles of track between here and Louisville, Ky., will come under the scrutiny of this car's measuring gadgets before the day is done, and each hour will tick off pleasant surprises or disappointments as the impersonal pens of recording mechanisms trace out a detailed "electric-cardiogram" of track conditions.

It's 7:50 a.m., and we're about ready to pull out. Coupled to the rear of No. 99, the northbound Memphis connection of the Pan American headed for Cincinnati, are the Gyro car RI-1 and L.&N. business car 302, the former bringing up the rear. "We," includes the "bosses" of the party—W. S. Moore, superintendent of the Louisville division, and Edward Wise, Jr., engineer maintenance of way of the L.&N. system—together with a guest observer, E. C. Vandenburgh, chief engineer, Chicago & North Western; four men from the engineering department of the L.&N. Louisville division; several Sperry Rail Service men, headed by Steve Murphy, western sales representa-

The Gyro Track Recorder Car, a specially fitted-up unit owned by the C.&O., is always coupled to the rear of the train, where a clear view of the track is afforded

Looking down on the recording table, showing a number of the 17 recording pens and the paper tape. The Sperry gyroscope, forming part of the mechanism that records track superelevation and cross level, is shown in the black case at the right

# the Gyro Car on the L. & N.

*This article is an editor's report on a day with the Gyro car operating on the Louisville & Nashville between Memphis, Tenn., and Louisville, Ky. The Gyro car is operated over all principal lines of this company twice a year to make a permanent record of low joints, alinement, cross level and surface. This article deviates somewhat in style from the usual technical report to give the "feel" of these biannual track inspections on the L. & N., but it faithfully describes the methods and equipment used, and cites the belief of the road that such inspections pay off in esprit de corps and better track.*

tive; your reporter; and three supervisors and a dozen or more foremen, whose territories lie immediately ahead.

Already the Gyro in this spring inspection has tested 1,540 mi. of L&N. main and branch lines, having begun its snooping on May 10; 309 mi. will be tested today; and an additional 1,280 mi. will round out the job on May 25—a total of 3,133 mi. Currently, individual division engineers, supervisors and foremen get their ratings—know the worst—as their territories are covered, and almost within a matter of hours after the close of the inspection on May 25, comparisons of all territories on the system will be available, winners will be announced, and another chapter in eight years of Gyro track car inspection on the L.&N.—spring and fall—will have been written.

This Gyro car, fitted up in 1937 by the C.&O. at its Huntington, W. Va., shops, includes a variety of detecting and recording mechanisms which make a continuous graphic record of curvature and alinement, cross level and superelevation, surface variations in each rail independent of the cross level, the distance traveled, the elapsed time at any desired interval, and the location of mileposts and other landmarks. From the time and distance records the speed of operation at any point can be determined. Landmarks, such as mileposts, bridges, road crossings, turnouts, tunnels, stations, etc., can be indicated directly on the chart by means of push buttons in the hands of two observers on opposite sides of the car, and identified by suitable notation by the operator.

## The Recording Mechanism

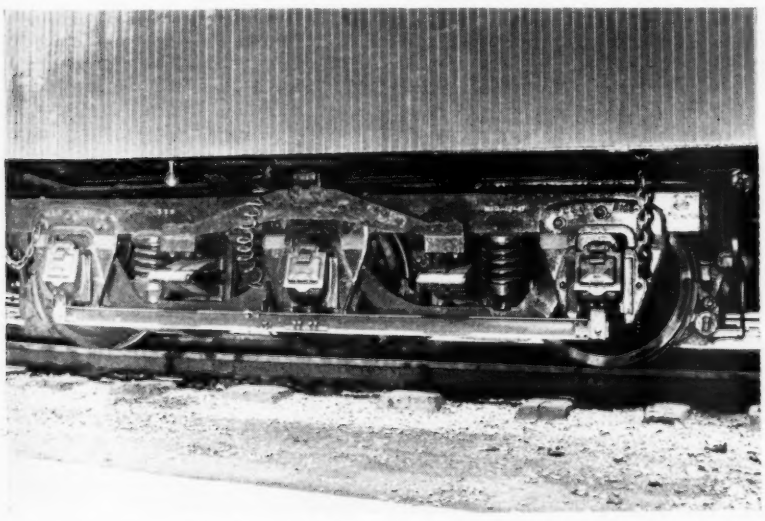
The recording mechanism is mounted in the center section of the Gyro car. Also included in the car are office quarters for the operators and a 25-ft. observation end with 17 double, upholstered seats, tiered on opposite sides of a center ramp. The design of the recording mechanism is such that the car can be operated in either direction with equal facility, while accuracy of the record is not affected appreciably by any reasonable speed, by variations in speed, or by rolling or nosing of the car body.

The basic unit of the recording mechanism is a table equipped with rollers carrying a 24-in. paper tape which moves continuously across the table at a rate that is in direct proportion to the speed of the car. The table is equipped with a total of 17 pens. Eight of these pens are attached to the actuating mechanisms and record, respectively: (1) low joints on left rail; (2) low joints on right rail; (3) alinement (degree of curvature to scale); (4) cross level; (5) surface; (6) distance; (7) time intervals; and (8) landmarks. Of the other nine pens, five form base lines; two form grading lines, ¼ in. to one side of each of the two low-joint base lines; and two form other grading lines, ¼ in. each side of the surface base line.

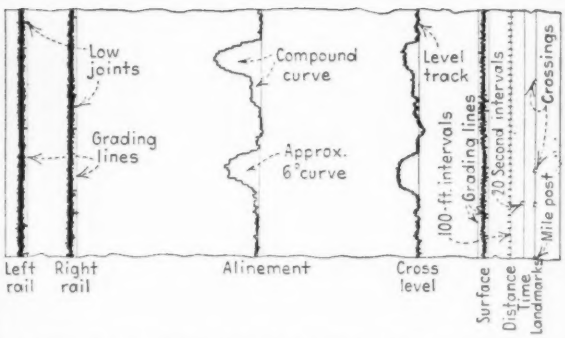
An essential element of the equipment is a two-wheel measuring and recording truck, mounted under the car midway between the end trucks in such a way that it is free to move within wide limits, both vertically and horizontally, relative to the car body, and to tilt or rotate about its longitudinal axis. As these motions are imparted to it by the track, they are transmitted through suitable connections and actuate corresponding pens on the recording table, the magnitude of the variations from straight lines by the pen lines being in direct ratio to the amplitude of the movements of the truck. The truck cannot move longitudinally relative to the car body, or slue or rotate about its vertical axis, except within very narrow limits.

Since the truck must be free to move laterally or vertically, or to tilt, it is not depended on to carry any of the weight of the car, only sufficient weight being imposed upon it to keep it firmly on the track and to insure stabilization. It is also attached to the car in such a way that when it is displaced laterally, it moves in a straight line and tends to return to its central position under the car.

The journal boxes are clamped rigidly to the truck frame to insure that there will be no relative movement between them and the frame, as in the conventional type of truck.



**Low joints are recorded independently of other surface variations by measuring the rise and fall of the middle pair of wheels in the six-wheel truck at rear of car**




**Above—A section of the tape, showing character of the records made. Left—The "score" is tallied up currently in one of the office compartments of the car, so that each supervisor can have the record of his territory before he leaves the car. In calculating the overall score, joint conditions count 25 per cent, alinement and cross level each 28.5 per cent, and track surface 18 per cent. The highest score for the system is 96.52**

The reason for this is that the recording devices are attached to the truck frame which, obviously, must follow accurately all variations in the track transmitted to it by the wheels and axle.

### The Tape Record

The paper tape upon which the record of track conditions is made is driven from the wheels and axle of the truck by means of a system of gears and shafts, the latter being equipped with universal and telescoping joints to allow for the various movements of the truck.

The tendency of the truck to remain centered is utilized to record curvature. As the car rounds a curve, the recording truck moves laterally, but always hugs the inside rail of the curve. This lateral movement is transmitted to one of the pens on the recording table, displacing it in a fixed ratio to the displacement of the truck. By means of a suitable scale, the degree of curve can be read directly by measuring the distance between the base line and the pen line on the chart.

Superelevation on curves and cross level on tangents are obtained by recording the transverse tilt of the truck. This motion is transmitted by means of a shaft and a system of levers, through a gyroscope, to another of the pens on the recording table. A fixed base line is established on the chart by the gyroscope to make it independent of the tilting of the car or truck, and the deviation of the recording pen from this line, measured with a suitable scale, indicates the amount the track is out of level.

Surface variations in the track are measured by the rise and fall of the center truck relative to the car frame. The value recorded at any specific time is the difference in the elevation of the tops of the rails at the recording truck and the rail elevation at the centers of the end trucks.

Low joints are recorded independently of other surface variations by measuring the rise and fall of the middle pair of wheels in the six-wheel truck at the rear of the car. The motion of each wheel is transmitted by means of a hydraulic system directly to a recording pen, and thus to the tape.

Time and distance are recorded at 20-sec. and 100-ft. intervals, respectively, the former being controlled by a clock, and the latter by suitable electrical contacts in the table-drive mechanism. The locations of landmarks and mileposts are recorded by a pen that is controlled by two push buttons, operated by observers at observation windows on opposite sides of the car, directly opposite the recording table. The observers identify each landmark by calling out to the operator, who makes suitable rubber-stamp notes on the margin of the tape. For ready reference while running, an electrical speed indicator is provided, but the speed between any given points is subsequently obtained from the time and distance records on the chart.

### Lights Flash—Bells Ring

A panel within the observation end of the car, directly above the rear door, contains a speedometer, a clock, an air pressure gage, and five bull's-eyes—two red, two amber, and one clear—all visible from the observation seats. One amber eye and one red eye are located on each side of the panel, while the clear eye is mounted in the center. Through electrical contact with the recording penholders, the amber light on one side or the other flashes when a rail joint on the respective side more than ¼ in. low is encountered. If a joint is more than ½ in. low, both the amber and red lights flash on the side involved. The clear light flashes for variations of more than ½ in. in surface.

Simultaneously, bells of different tone ring to provide an audible indication of the different light symbols. Low joints and surface irregularities are counted automatically on the recording mechanism table by means of magnetic counters. The car is also equipped with a 110-volt motor-generator which may be used to operate calculating machines, moving picture machines, etc.

### The Operating Crew

The Sperry crew which is operating the recording equipment on today's run includes Bill Stewart, chief operator, and two assistants, while the assisting L.&N. engineering department crew of four men is headed by Bob McLaughlin, assistant engineer, who, assisted by Lionel Currier, draftsman, acts as the chief grader. The other two L.&N. men, Joe Wells and Joe Newton, both instrumentmen from the division engineer's office, act as the "callers" of landmarks. Supervising Sperry operations on this particular trip is Bill Kellner, field supervisor.

The Memphis line being tested today does not rank in some respects with L.&N. main-line track, but it is a sturdy piece of railroad and is maintained to a high standard. It is laid with 100-lb. new and released rail, with built-up ends, supported on twenty-two 7-in. by 9-in. by 8½-ft. treated ties to the panel, and is ballasted throughout with slag and

**Some of the "official" party on the inspection of the Memphis line: Right to left—W. S. Moore, superintendent of the Louisville division, L. & N.; E. C. Vandenburgh, chief engineer, C. & N. W.; S. P. Murphy, western sales representative, Sperry Rail Service; Edward Wise, Jr., engineer maintenance of way, L. & N.; and J. P. Bolling, assistant division engineer, Louisville division, L. & N.**

limestone. Single-shoulder, four-hole tie plates are the rule, and anchoring consists generally of 5 to 10 anchors to the rail length. Daily traffic on the line includes three passenger trains each way and three regularly scheduled freights, plus extras from time to time. All motive power is steam, and speeds are held below 60 m.p.h. because this territory is not equipped with automatic block signals.

### Well on Our Way

We're already rolling along over some pretty fine countryside — and track—at a speed of about 55 m.p.h. We're on supervisor "Mack" Perkin's territory, and he's "not doing bad" again this year. In last spring's test "Mack" won the system "sweepstakes" with a weighted average of 98.55, and it looks as though he'll be high in the running again this year. "Irregularity" bells of any tone are few and far between, and the tape lines look unusually steady.

We've just left Foreman Jim Wilson's 12-mi. section, and the boys are giving him a hand. Wilson chalked up a 99.63 rating last fall, with five perfect miles, and the car has just chalked up three perfect miles out of the last four. Jim has four men in his gang, who are just as anxious that he win as he is. "I couldn't do it without those colored boys," he says.

12:13 p.m.—We're now at Erin, Tenn., 175 mi. from Memphis, and about ten more foremen climb on the car as some drop off, bringing new tension and suspense on the one hand, and relief, satisfaction or disappointment on the other. Both ways, as they come and go, Engineer Maintenance of Way Wise gives them a big smile and a handshake, and the show goes on—more miles, more yards of record tape, more suspense.

Behind the scenes, assistant engineer McLaughlin and draftsman Currier, in one of the office compartments of the car, grade sections of the tape torn from the machine periodically and tally up the score for each section and subdivision. In this they count up demerits due to low joints, and to irregularities above specified limits in cross level, superelevation and surface, and come up with the answer, tabulated on printed forms, before each supervisor leaves the train. The supervisors are also given the sections of the record tape covering their respective territories before they get off and, in turn, they distribute proper lengths of the tape to each of their section foremen, who thereby know exactly where to go to work on the bad spots.

In calculating the overall score, low joints count 25 per cent, alinement and cross level each 28.5 per cent, and surface 18 per cent. A perfect mile is one with no joints lower than ¼ in.; no alinement or cross-level variation of more than ⅛ in.; and no surface variation greater than ¼ in.—and that's good track on anybody's railroad.

Now the first 180 mi. are behind us, and the most welcome bell of the day thus far is the luncheon bell for the first "sitting"—while others carry on the test continuously.

And so on into the afternoon. At Russellville, 237 mi. from Memphis, about fifteen more foremen and two supervisors get off the train while still other foremen climb on.

At Memphis junction, near Bowling Green, Ky., we hit the north and south mainline of the L.&N. between Louisville and New Orleans, and pull up the pens for awhile, as some of this territory has already been tested in this spring test. But at Parkton, Ky., about 44 mi. from Louisville, where double track begins, we drop the pens again and test right up to Milepost 1.6, almost within sight of the L.&N. Louisville station.

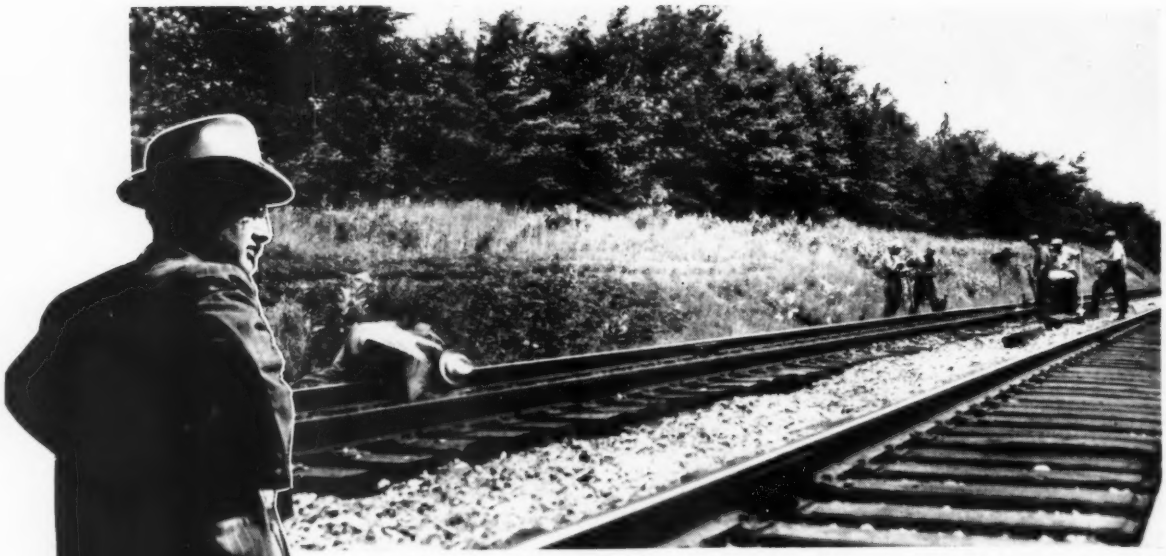
At Bowling Green Division Engineer R. C. Young, Sr., joined the party. He has just returned from attending a meeting of the A.R.E.A. Committee on Roadway and Ballast at Roanoke, Va., and is anxious to see the record sheets for the day, do some fast figuring of grades, and learn the approximate score. Mr. Young has kept the Louisville division in first place for four out of the last five tests and is anxious to finish this test in first place—but he will be "on the spot" until the entire test is completed on May 25.*

It is now 5:25 p.m. We pull to a stop in the station. The day's work is done. Strain and tension to the contrary, notwithstanding, everybody is smiling.

Tonight the Gyro car, with business car 362, will deadhead to Nashville, and tomorrow will test all of the 324 mi. into St. Louis, Mo., with Engineer Maintenance of Way Wise still at the helm.

All of this testing, which is done under the general direction of C. H. Blackman, chief engineer, costs money—about $1.15 per mile for the rental of the car, with recording crew, plus a few meals and various incidentals—but the L.&N. is convinced that it pays off in better esprit de corps among its men and better track—and its 96.52 system record in the December, 1948, inspection, compared with a rating of 87.26 for the system at the time of its first Gyro testing in March, 1942, would appear to substantiate the claim.

*May 25—Mr. Young again came through on top, the Louisville division winning the 1949 spring inspection with a rating of 97.13. The Cincinnati division, of which I. W. Newman is division engineer, won second place with a rating of 97.08; and the Evansville division, of which J. K. Gloster is division engineer, won third place with a rating of 96.22. The top ranking supervisor on the system was W. Holland on the Cincinnati division, with a grade of 98.86, who was closely followed by Supervisor A. E. Logsdon on the Louisville division, with a grade of 98.42. The system rating in the test was 95.26.



To permit closer supervision of the section gangs additional roadmasters are recommended

# A Formula for Dealing w

By CHIEF ENGINEER

• If it is to be possible to maintain the tracks and structures to their present standards without largely increased expenditures after the 40-hr. week goes into effect it will be necessary to take a number of steps, some of them of a far-reaching nature, effecting the track and bridge and building forces. Careful study of the problem has led to the conclusion that seven such steps will be required, which may be summarized as follows:

(1) Increase supervision in order to enhance the output of the men by having them work at the proper locations and on essential jobs.

(2) Purchase additional labor-saving tools and machines.

(3) Obtain a better class of labor. (This should be possible in view of the higher hourly wage rates that will be in effect.)

(4) Inaugurate policies that will result in increased production over and above that obtained through the means set forth in Items 1 and 3 above.

(5) Lengthen track sections where it is possible to do so and where savings can be made by so doing.

(6) Employ a type of construction and maintenance requiring the least application of labor. In track work this would mean the use of rock ballast on main line track instead of pit-run gravel, the closer spacing of ties where indicated, and the driving of poles or grouting where necessary to stabilize the roadbed.

(7) Establish a floating extra gang on each roadmaster's district to reduce work of the section gangs to a minimum.

Regarding Item 1 the plan is to shorten the districts of the individual roadmasters to the extent that each of them can cover his territory completely in two days, thereby permitting him to exercise the proper supervision over the section gangs. This plan should result in elimination of most of the time lost by the section foreman in patrolling track, and should make it possible for them to work each day at specified locations. If the work on a particular section is not going forward properly the roadmaster will be in a better position to detect the difficulty and give the gang the necessary attention.

To provide the additional supervision that is contemplated one-half again as many roadmasters' districts will be required. At the present time (about May 1) it would be desirable to obtain the authority to employ these men as assistant roadmasters, with the intention of carrying them under this title until the latter part of August, at which time they would be promoted to roadmasters and assigned regular and permanent districts. As the organization is set up today each division has four roadmasters and one assistant roadmaster. After September 1, when the assistant roadmasters have been promoted to roadmasters, there would be six roadmasters and one assistant to each division. This would mean an increase of about fifty percent in the number of roadmasters, with no change in the number of assistants now used.

The additional roadmasters that will be on the rolls after September 1 will involve a total monthly outlay for salaries of $5,000. Each additional roadmaster can be employed at about the same amount as would be received by two track laborers. As a result of the increased output obtained because of the closer supervision that will be

**Recommendations for Additional Power Tools and Machines, with the Estimated Savings**
(Assuming Continuous Use Throughout the Year)

| | Unit Cost | Total Cost | Estimated Annual Saving |
|---|---|---|---|
| 1—12-tool electric tie tamper with tools | $20,000 | $20,000 | $19,000 |
| 34—4-tool electric tie tamper | 2,100 | 71,400 | 81,600 |
| 56—30 cu. ft. compressors for tie tampers | 770 | 43,120 | |
| 224—Tie tamper tools | 140 | 31,360 | 134,400 |
| 12—Unit tie tampers | 400 | 4,800 | 7,200 |
| 2—Spike drivers | 2,250 | 4,500 | 25,400 |
| 3—Cribbers | 2,250 | 6,750 | 8,352 |
| 10—Rail saws | 600 | 6,000 | 5,847 |
| 10—Rail drills | 225 | 2,250 | 1,949 |
| 10—Bolt tighteners | 1,250 | 12,500 | 25,000 |
| 1—½-yd. dragline | 16,000 | 16,000 | 4,445 |
| 12—Sets electric 180-cycle generators | 500 | | |
| 12 timber saws and conductors | 350 | | |
| 12 electric drills | 120 | | |
| 12 electric impact wrenches | 320 | | |
| 12 electric skilsaws | 200 | 17,800 | |
| Total cost and total saving | | $236,560 | $313,393 |

***This article is based on a report submitted to his management by the chief engineer of a large railroad. It comprises an unusually comprehensive approach to the problem presented by the impending five-day week for the maintenance forces. On the premise that it will not be possible or necessary to effect a material increase in the present force to compensate for the time lost due to the shorter week, the report outlines a formula for increasing the efficiency of the existing organization through closer supervision, greater mechanization, higher standards of construction, lengthening the track sections, stabilization of the roadbed, the use of small floating gangs on the roadmasters' districts, and other measures.***

# with the 40-Hr. Week

possible it is estimated that each of the additional roadmasters will save from ten to twenty men per district. On this basis it is estimated that the increased output directly attributable to these additional roadmasters will be equivalent to the output of 150 additional men. In other words, for an expenditure of $5,000 per month for additional supervision, 150 men can be saved which, at a monthly rate of $200 per man, would amount to a total of $30,000 per month for labor. This total of 150 men will represent approximately one-half the number of additional men needed to make up the loss that will be sustained when the 40-hr. week goes into effect.

### Would Buy More Equipment

To implement Item 2 above (additional labor-saving tools and equipment) the acquisition of additional equipment is recommended as shown in the accompanying table, which gives the cost of each unit and the estimated annual saving that would result from its use. It should be understood that the annual savings shown in the table for machines used in laying rail out-of-face or for surfacing track will not be realized if such work is not undertaken. For instance, the annual saving of $19,000 that is shown for a 12-tool electric tie-tamping outfit would be realized only in event the outfit is used continuously for the entire year. The same is true for all the other machines included in the list. The table indicates that the purchase of additional machines recommended could result in total estimated savings of approximately $300,000 annually for track work alone. Converted into section labor this figure represents the equivalent of about 150 section men.

The problem of getting increased production (Item 4) over and above that resulting from closer supervision and additional machines (Items 1 and 3) is one that involves some overlapping with the question of increased mechanization. For example, aside from the increased output resulting directly from the use of a power-operated machine, there is a favorable psychological effect on the man using the machine, which causes him to put more energy and willingness into his work. Further, a man has a tendency to turn out more work when it is made easy and attractive to him.

It is the opinion of the division engineers that workmen are now operating at about 75 to 80 percent of their pre-war efficiency. It is believed that by various means it will be possible to effect an increase of 10 to 15 percent in the efficiency of the men within the near future and that eventually their efficiency will return to pre-war levels.

Regarding the possibilities for effecting economies by lengthening sections (Item 5), the recommendations of half of the divisions are that the present section limits be retained. Other divisions recommend that certain sections be extended. Probably the plans developed by these latter divisions are workable and may produce satisfactory results. However, it is the opinion that an extensive program for lengthening sections should not be undertaken at this time. Where it is feasible to eliminate sections and to lengthen others, this should be done gradually, probably commencing during the early part of next year. If the lengthening of sections is started it is suggested that this begin at the more promising locations and then continue the program only to the extent that it proves practical and economical.

### Better Ballast, More Ties

As for Item No. 6, suggesting the use of types of construction and maintenance requiring a minimum of labor, this should develop into quite a study of economics. When certain types of ballast was being purchased for 25 cents a yard and labor was costing 25 cents an hour, the type of ballast was of little concern and made little difference if it had to be replaced in three or four years. Now this material is costing approximately 60 cents a yard and soon track men will be paid $1.16 an hour for labor in working it.

For these reasons it is difficult to see how the continued use of inferior types of ballast can be justified if a better type of ballast can be obtained at a reasonable cost, particularly at locations where maintenance work is heavy because of the effect of heavy traffic and high-speed trains. Therefore, serious consideration should be given to strengthening the track structure, not only by using a more stable type of ballast in lieu of an inferior ballast, but also by using more ties to the 39-ft. rail.

The question of whether and where to go to better ballast and more ties per rail is one that can only be answered by a study that will be difficult to make. The proper thing to do is to install test sections of the improved construction at locations where high labor costs have been experienced in maintaining the track. If these labor costs are then reduced a sufficient amount to justify the added cost of the construction, then a long-range program for improving the track structure could be planned.

The higher labor costs soon to be in effect will also justify more roadbed stabilization by pole driving and pressure grouting. Where chronic conditions are corrected in this manner there will not only be a substantial saving in labor but there will also be a large reduction in ballast requirements. If money were available at this time for embankment stabilization the driving of thousands of poles would be justified. Also the continuous use of pressure-grouting gangs would be justified. These operations would, of course, involve large expenditures. A gang to handle grouting work would cost $50,000 to $60,000 a year, including the materials needed. The equipment required by the gang would cost an additional $15,000.

### Roadmasters' Floating Gangs

The last item, No. 7, recommends the establishment of a small floating gang on each roadmaster's district. Each of these gangs would be equipped with a motor truck and an outfit car that could be moved from place to place, thus keeping to a minimum the distance that the gang must travel in getting to and from work. On divisions where this has been done it has proved very satisfactory. The use of such a gang permits the number of men in the section gangs to be reduced to a minimum, allowing just enough men to operate a motor car and to carry out the ordinary run of track maintenance work, such as spot surfacing, lining, and the spotting in of new ties.

The floating gangs would be used for installing turnouts, helping the section gangs to catch up on their work, doing out-of-face surfacing, and other jobs over their respective roadmasters' districts that could not be handled by the small section gangs. This arrangement would also prove beneficial in the event of emergencies, such as derailments or washouts, when it becomes necessary to assemble men and get them to a certain location in a short period of time. This advantage will be particularly noticeable when, under the five-day week, an emergency arises on Saturday or Sunday. In some instances it may be necessary to work the floating gangs on Saturday, either on a staggered or an overtime basis.

Request should not be made at this time to equip each floating gang with a truck. The recommendation is that six or eight trucks should be obtained this year, placing them at the most attractive locations, and follow up in 1950 with quite an extensive program so that possibly by 1951 all of the roadmasters' districts would be so equipped.

All divisions are in agreement on the point that there need be no change in the number of bridge and building gangs when the five-day week goes into effect. By further mechanizing these gangs they will be able to do the same amount of work in five days that is now being done in six. About 30 per cent of the bridge and building outfits are not mechanized and others will need additional tools and equipment. For an expenditure of $25,000 to $30,000 the mechanization of these gangs can be completed except for the purchase of additional trucks. There are certain bridge and building gangs that should be provided with trucks during the next several years, but there are a considerable number of other gangs that cannot operate in such a manner as to justify the cost of this equipment. It is not recommended that a wholesale program of buying trucks for the bridge and building forces be undertaken at this time. Rather, we should continue with the present program, placing trucks with the outfits where their use is found to be economically justified.

## Bulldozers Move "Mountain" of Ballast

***DEMONSTRATING further the versatility of the crawler bulldozer in railroad service a number of these machines were recently used to shift large amounts of slag ballast to points along a spur track on the Chicago, Burlington & Quincy where it could be reached by a track-mounted clamshell for loading into ballast cars. Such ballast is stockpiled by the Burlington along a track in its yards at West Burlington, Iowa. Recently the stockpile, once containing some 6,000 carloads of ballast, had been reduced to 1,800 carloads, and in so doing the clamshell had loaded all the material within the limits of its swing. It was then that the dozers—consisting of International TD-9's—were brought into play. As shown in this view, they pushed the ballast approximately 175 ft. toward the track, and loading operations again got underway.***

Prefabricated materials and a simple design permitted rapid construction of this 44-ft. by 240-ft. repair shop at Colver, Pa.

# Car Repair Shop ERECTED IN 60 DAYS

• To provide facilities for repairing hopper coal cars, which work had been let previously to car building companies under contract, the Cambria & Indiana, taking full advantage of the economies of simple design, prefabricated materials and available power tools, recently constructed a car-repair shop 44 ft. wide by 240 ft. long, at the relatively low cost of $41,500. Located at Colver, Pa., the shop was built in 60 days by the road's own forces.

The frame of the new shop building is constructed of lightweight Stran-Steel, manufactured by the Great Lakes Steel Corporation and fabricated by the Carew Steel Products Corporation. The roof, sides and ends are covered with 24-gage corrugated, Robertson Asbestos-Protected Metal. Heating is provided by fan-circulated warm air, and ventilation is by means of four ventilators located on the ridge of the roof.

The foundation of the building consists of 26 piers, each 2½ ft. by 3 ft., by 5 ft. deep, spaced 20 ft. apart in two rows, one row along each side of the building. There are no piers at the ends of the building, except at the corners. The spaces between the piers are walled up to the tops of the piers with 8-in. concrete blocks. Each pier supports a column consisting of two 10-in. channel sections, back to back, with ¾-in. bearing plates at top and bottom. Set on top of the columns to form a header the full length of the building, are beams of the same construction as the columns.

The roof is supported by lightweight, prefabricated, welded trusses of the Pratt type spaced 4 ft. apart and welded to the header beams. The purlins, each consisting of two 2-5/16-in. 18-gage channels, back to back, welded to the trusses, are spaced 4 ft. 9 in. apart, except at the eaves and the ridge where the spacing is closer. The corrugated roofing sheets are nailed directly to the purlins by driving the nails between the two channels which form the purlins.

The studs at the sides, spaced 4 ft. apart, and at the ends, spaced 4 ft. 6 in. apart, are made of 6-in., 16-gage twin channels, and are welded to the beams at the top and anchored at the bottom to the concrete block wall. These members are also designed to hold nails driven between the two channels of which they are made. Consequently, the siding sheets are nailed directly to the studding.

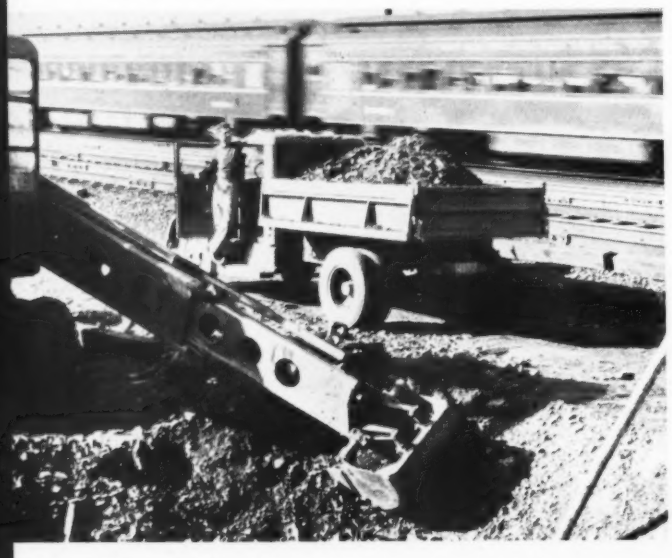
The openings provided in the building include two track doorways, each 13 ft. by 16 ft. 6 in., and one trucking doorway, 14 ft. by 13 ft. 6 in., all with double sliding doors. In addition, there are three smaller doors and a total of 41 windows. Running longitudinally through the building is a single track located 5½ ft. off center. The entire floor of the building, including the track area, is paved with concrete. For lifting operations in connection with car repair work and for handling materials, both inside and outside the building, a 10-ton Krane Kar is used.

This project was carried out under the general direction of G. H. Burnette, president, Cambria & Indiana, and under the direct supervision of J. H. Smith, superintendent, M. D. Rodgers, engineer maintenance of way, and F. B. Rodgers, assistant engineer. As stated, the project was completed in 60 working days. The number of men on the job at one time ranged from 10 to 14. The major equipment employed in carrying out this project included an American locomotive crane for erection work, two Lincoln electric welders for all welding operations, and a six-ton International bulldozer for necessary grading.

# Versatile Machine Aid

Above—A Gradall being used to clean out one of the deep ditches along the main line of Pennsylvania's New York division

Above—The deep ditching has the effect of turning the entire roadbed into a fill—even in cuts. Below—By tilting its bucket laterally, as shown here, the Gradall can dress side slopes



• For the past 10 years the Pennsylvania has had under way an extensive drainage program on the main line of its New York division extending between New York and Philadelphia, Pa., 91 mi.—an electrified line often referred to as the busiest stretch of track in the world. Much of this line traverses an almost flat, swamp-like country in which the water table is very near the surface of the ground. Because of capillary action, stimulated by the vibration of passing trains, the subsurface water was drawn even higher in the subgrade, causing the formation of water pockets and other kindred evils, such as foul ballast, pumping joints, etc.

Such conditions were particularly undesirable on this high-speed, four-track line, carrying as it does roughly 400 scheduled passenger trains and an average of 45 freight trains daily, the former traveling as fast as 75 m.p.h., and the latter 50 m.p.h. Therefore, it was necessary to take positive corrective measures to overcome them.

The corrective measures taken involved, as already mentioned, a system of deep side ditches along both sides of the track. In general, these ditches were made to a depth of eight feet below rail, and four feet wide at the bottoms. This design was followed with great care and had the effect of turning the entire roadbed into a fill —even in cuts.

In addition, they involved an elaborate system of deep lead-off ditches or "canals," some of considerable length, to collect the water discharged from the side ditches and carry it to streams for ultimate disposal. These drainage canals, of necessity, were constructed to a depth of eight feet or more, to be effective. In general, the ditches have 1½ to 1 slopes.

### Difficult to Keep Clean

Because of the flat terrain, both the side ditches and the lead-off ditches have very light grades—usually 0.2 per cent, and seldom greater than 0.4 per cent. As a result, the flow of water in them has never been swift, and from the outset difficulty has been experienced in keeping them cleaned out to the proper depth.

Recently, the division acquired a new excavating machine, known as the Gradall, primarily for use in cleaning out the system of deep ditches. This is a truck-mounted machine, consisting essentially of a full-revolving frame supporting a telescoping boom with a digging bucket attached at the outer end. All movements of the machine, except travel, are controlled hydraulically from the operator's cab on the revolving frame. Travel of the unit, at road speeds up to 45 m.p.h., is controlled from the driver's seat of the truck.

The boom of the Gradall may be raised 22 deg. above the horizontal or lowered 44 deg. below it. Through its telescoping feature, the boom may be extended or contracted through a range of 12 ft., the maximum extended length being 24 ft. These features permit raising the bucket 14 ft. 9 in. above the grade on which the truck wheels are resting or lowering it 10 ft. below the grade. Also, the boom may be rotated or tilted about its longitudinal axis, the arc of the rotation being 45 deg. each side of the vertical. Although the frame revolves through 360 deg., the horizontal digging range is limited by the driver's cab to 270 deg.

# Aids in Ditching Work

*Some years ago the Pennsylvania initiated an extensive deep-ditching program on its New York division, the purpose being to lower the water table and thereby gain the benefits of increased roadbed stability—improved riding and reduced maintenance. To assist in keeping many miles of such ditches clean, the road has recently acquired a Gradall—a highly versatile unit of earthmoving equipment—which is being used effectively not only in ditch cleaning, but also in many types of light ditch construction.*

On one ditch-cleaning project on the New York division, involving about 2500 ft. of side ditch, four feet wide at the bottom and eight feet deep, the Gradall worked on the side of the ditch away from the track and deposited the excavated material about 20 ft. farther back. Because there was no suitable roadway for the machine in this location, a bulldozer was used to prepare such a road, one day being required for this task. Later, the bulldozer spent 1½ days spreading the material removed from the ditch.

On this project the Gradall removed between ⅜ and ½ cu. yd. of material from each foot of ditch at a cost of $0.22 per yard. This figure includes labor (operator and driver), repairs, interest, taxes, depreciation and other operating expenses. Including the bulldozer charges, the total cost of the job came to $0.1085 per foot of ditch, or $0.29 per cubic yard of material handled. To have done the work by hand would have cost an estimated $0.495 per foot.

While used primarily for cleaning ditches, such as the project described, the New York division had used the Gradall on a number of light ditch construction projects. One such job involved digging a new side ditch seven feet deep, the lower five feet of which was in fairly hard shale. In this work about 2.3 cu. yd. of material was removed per lineal foot of ditch. In nine days 324 ft. of finished ditch was completed at a cost of $0.69 per cubic yard of excavation. A contractor estimated $0.94 per cubic yard for this particular project.

On another construction job, the Gradall was used to dig a trench for a new water line three feet deep, and to back-fill the trench after the pipe was laid. The cost of the work, which involved 371 ft. of trench, was $0.73 per foot. Hard work on this project would have cost $1.26 per foot, according to an estimate, and would have resulted in an increase in the cost of installing the pipe, because the ditch would have been more restricted in size, and thus would have hampered the men installing the pipe. A contractor's estimate for this work was $1.08 per foot.

In another ditching project, carried out just west of New Brunswick, N. J., the Gradall was used in a light cut to fill a shallow existing ditch, which was fairly close to the ballast border, and, at the same time, to dig a new ditch eight feet deep, several feet farther away from the track. This had the effect of widening the bank to 20 ft., imparting greater support for the outside shoulder, while gaining also the benefits of improved drainage. Many projects similar to those already described are programmed for the present season.

The Central region of the Pennsylvania has also acquired a Gradall and is using it in a variety of off-track ditching and bank-widening projects, a number of which have been on the Eastern division between Pittsburgh, Pa., and Crestline, Ohio. On one such project, near Alliance, Ohio, the unit was used to deepen and cut back the existing ditch at a location where the right-of-way is restricted.

The bucket is attached to the boom with its open end toward the machine, and its controls are such that it may be rotated in line with the boom through an angle of 116 deg., in much the same manner as the up and down movement imparted to the human hand by the action of the wrist. When the Gradall is in operation, the boom is extended and lowered until the bucket touches the ground. The boom is then retracted and, at the same time, the bucket is rotated downward, toward the machine, to scoop up the material. Dumping is accomplished by swinging the boom over the desired point and rotating the bucket outward, or forward, thus placing the open end down.

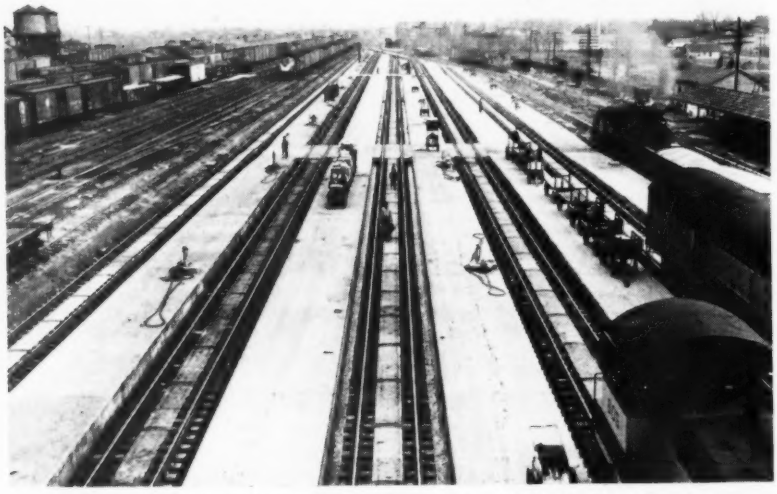
### Does a Finished Job

One of the outstanding characteristics of the Gradall is that it produces a finished job on almost every excavating assignment within its capabilities. This is due to the precision with which an experienced operator can move the bucket and to the tilting feature, achieved by rotating the boom about its long axis. Thus, the side slopes and bottom of a ditch may be constructed to the finished grade in one operation. Another advantage of the machine is that it can work under low power or communication lines, in no way interfering with them when working either from the top or, if sufficient lateral clearance exists, from the bottom of a ditch.

**A Gradall in operation on the Central region, widening a ditch at a restricted location**

# Modern Diesel and Coach Facilities at Imp

*In carrying out a wholesale revision of its station track layout at Florence, S.C., the Atlantic Coast Line installed the latest facilities for fueling and watering Diesel locomotives for supplying water to passenger coaches. Florence is an important point for the transfer of passengers and the servicing of through trains to and from Florida, and the improved facilities were necessary to save train time and for other reasons. This article describes the general nature of the improvements and gives details of the servicing facilities.*

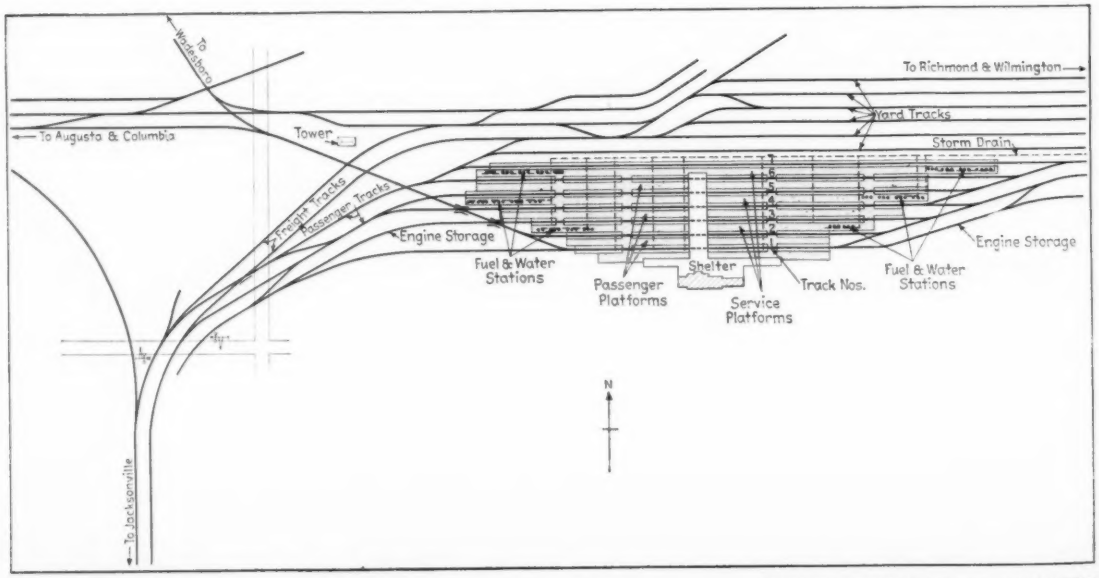


Above—Looking east over the track area of the Atlantic Coast Line's passenger station at Florence, S. C. Below—Sketch plan of the facilities at Florence

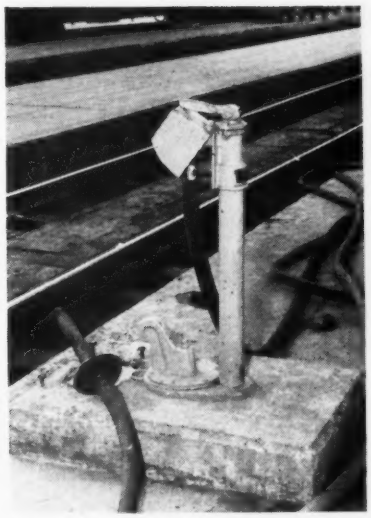
• In connection with extensive improvements made to the track and platform layout at its passenger station at Florence, S.C., the Atlantic Coast Line has provided modern fueling and watering facilities for Diesel locomotives, and has installed pollution-proof hydrants for watering coaches. As a consequence, in addition to all the other advantages that go with a modern station layout, a substantial reduction has been effected in the time required for servicing locomotives, waste of fuel oil has been eliminated, and the coach-watering facilities now conform to the requirements of the U. S. Public Health Service.

## Old Layout Inadequate

The station layout at Florence consists of seven through tracks served by inter-track platforms. Before the improvements the tracks were of such length as to permit standing room for trains of only 12 to 14 cars, which was inadequate for the 20-car Diesel-drawn trains of today, and all train servicing, including mail and express work, was done on any one of the inter-track platforms. Thus, there was frequent conflict between train servicing and passenger movements, resulting in confusion and some delays to trains. Further, the facilities for providing drinking



# Improved Station Layout



**Left—Fueling and watering facilities, capable of handling any combination of types of Diesels, are provided at both ends of each service platform. Above—McGarry pollution-proof coach-watering hydrants were placed at 90-ft. intervals**

water to coaches did not meet the sanitary requirements of the Public Health Service, while those for supplying fuel and water to Diesels were limited in number and capacity, having been installed as temporary expedients.

In the improvement program the station tracks were lengthened to accommodate 20-car trains with three-unit Diesel locomotives. These tracks were rebuilt on new concrete-slab supports; new separate concrete passenger and service platforms were constructed between the tracks; and modern Diesel locomotive fueling and watering facilities and modern sanitary coach-watering facilities were provided on the service platforms.

### Servicing Facilities

The Diesel locomotives servicing facilities were installed at each end of the three service platforms. These include separate Diesel fuel and water stands, which are so arranged that any combination of types of locomotives can be serviced with short hose connections. The new fueling facilities were connected to existing fuel supply lines, but new fuel meters and filters were installed and push-button controls were provided at each station.

The fuel and water stands are similar, except for the fittings for attaching the hoses to the locomotives. Each stand consists of an 8-in. channel support, 8 ft. high, and a 2½-in. wrought-iron pipe, with a cut-off valve located approximately 3 ft. above the platform. At the top of each riser is a swing joint with a short length of horizontal pipe to which is connected a 15-ft. length of 2½-in. hose. Each hose is equipped with a 2-in. Bowser nozzle and quick coupler. The couplers for fuel and water have distinctive lugs to eliminate mistakes in attaching water lines to fuel-oil connections or vice-versa. All piping for these facilities is of wrought iron, manufactured by the A. M. Byers Company, Pittsburgh, Pa., and has screw couplings. To prevent the possibility of leakage under the concrete track supports and platforms, the couplings were also electric welded.

### Coach-Watering Hydrants

For watering coaches, a number of McGarry, Style Cy-453-A, post-type hydrants, manufactured by the Railroad Products Company, Cincinnati, Ohio, were installed at 90-ft. intervals along each service platform. This type of hydrant is designed to withstand hard usage and is reported as being non-freezing, pollution-proof and self-draining. The hydrants are placed in line, near the south side of the platforms, eight feet from the center of the adjacent track. The hose connections on the hydrants are above the floor level of coaches to minimize further the possibility of contamination. A concrete block, 8 in. high, is located around each hydrant to prevent damage by baggage trucks. All pipe lines for the coach-watering system are of copper, with solder-type fittings, and range in size from 1 in. to 4 in. Copper piping was selected because of its high resistance to corrosion.

### Extensive Drainage System

As part of the project a new drainage system was installed beneath all of the station tracks, which embodies 11 lateral drains. These are of 12-in Armco corrugated, coated and perforated pipe and lead to a main out-fall line located directly north of and parallel with Track 7. The out-fall line, 2,250 ft. long, consists of 24-in., 30-in. and 36-in. Armco corrugated, coated pipe.

Drainage from the track area enters the system by means of drop inlets in the gutters of the track slabs, these feeding directly into the lateral drains. The inlets are made of corrugated, coated pipe tees of suitable size, the bottoms of which are filled with concrete, while the tops extend up to the surface of the gutters and are covered with cast iron gratings.

This project, which was carried out largely with company forces, was planned and executed under the general direction of Robert L. Groover, chief engineer of the Coast Line, Wilmington, N.C.

Left above—This mobile unit—two GE engine-driven welders towed by a jeep—was used effectively to repair poles along seven miles of rough terrain. Right above—The welders maintained a strong arc even though cables were 200 to 300 ft. long

# Jeep-Towed Welders Conquer Rough Terrain

• In undertaking the repair by electric welding of corroded high-tension poles located along a seven-mile stretch of the New York, New Haven & Hartford's electrified line between Stamford and New Haven, Conn., the contractor for the project—the Hallen Company, Long Island City, N.Y.—was confronted with a terrain so rough that many of the defective poles were inaccessible to conventional electric welding equipment. Therefore a special mobile unit was devised for the job, which consisted of two General Electric engine-driven welders mounted on a four-wheel, rubber-tired trailer towed by a jeep.

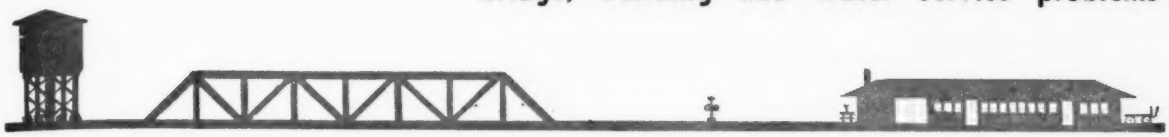
This unit proved to be highly effective; in all cases except one it was possible to tow the welders near enough to the poles to reach them with extension cables. The one exception was due to swampy ground too soft to support the jeep. In this case it was possible, because of the light weight of the welders and their compact construction, for five men to lift the entire rig from the trailer to a push cart and thus haul it close enough to the pole to do the work.

The repair of the defective poles involved three operations. First, as a safety precaution, a representative of the railroad's signal department detached the ground bonds from the poles and replaced them with jumpers to the track rails. Secondly, the concrete bases of the poles were broken away to expose the corroded parts. Finally, steel supports were welded around the webs of the poles. The use of extension cables not only made the poles accessible but also permitted work to be carried out on two poles simultaneously. The two G-E welding machines supplied ample power to maintain a strong arc even though the extension cables were 200 to 300 ft. long.

Left above—Showing corrosion in high tension pole from which the concrete base had been knocked away. Left—A pole after completion of electric welding work

# WHAT'S THE ANSWER?

**An open forum for maintenance men on track, bridge, building and water service problems**



## Intertrack Ballast Sections

*Should a full or limited ballast section be maintained in the intertrack space? Does the kind of ballast or other local conditions make any difference? Explain.*

### Maintain Limited Section

By J. W. NEIKIRK
Manager, Roadway Maintenance, Norfolk & Western, Roanoke, Va.

The ballast section in the intertrack space should be limited, consistent with the depth and kind of ballast used, tonnage, speed, alinement, rail conditions, etc. In territories where the subgrade and subballast are well drained and firm and where not less than 15 in. of standard stone ballast is maintained under the ties, the intertrack ballast section can be dressed satisfactorily on tangent track three inches below the tops of the ties of each track and sloped down to a point level with the bottoms of the ties midway between the tracks. On curves where similar conditions exist, the ballast section should be increased on the high side of the curve to conform to the standard ballast section used on the outside shoulder of curves to hold the track in good surface and alinement under high-speed, heavy traffic.

In territories where the roadbed is less stable owing to an inadequate depth of ballast under the ties or inadequate drainage, the ballast section in the intertrack space should be increased sufficiently to provide ballast for the necessary smoothing between reballasting cyles.

The kind of ballast used or other local conditions very definitely make a difference. Crushed stone ballast provides good drainage, stays in place, and holds the track in good line to a greater extent than other types of ballast. Consequently, the ballast section in the intertrack space where stone is used can be limited to the extent previously mentioned.

Gravel, cinder, sand and other types of ballast used have a tendency to creep or become distorted, particularly where rail conditions are not as good as they should be, permitting the surface and alinement to become irregular, have less holding qualities, and require more resurfacing. Therefore, a heavier ballast section is required, both on the berm and in the intertrack space.

### Depends on Track Centers

By G. M. O'ROURKE
Assistant Engineer Maintenance of Way, Illinois Central, Chicago

With reference to the first question we assume that "a full . . . ballast section" is one that fills the intertrack space from top-of-tie to top-of-tie. We use either a "heavy" or a "light" ballast section, neither of which could be called full. Our heavy section begins at the top of tie at the center of each track, extends on a 24 to 1 downward slope to a point 6 in. beyond the ends of the ties, which are passed 2 in. below their tops. It then slopes down to the subgrade 12 in. below the bottoms of ties—forming, for each track, toe lines 12 in apart for 15-ft. track centers, and 6 in. apart for 14-ft. centers.

Our "light" section begins at the top of ties just inside the rail, slopes down to the bottom ends of the ties so as to pass one inch under the base of rail, drops only one inch in the next nine, thence to the subgrade with the usual 12 in. or 6 in. between toe lines.

Whether a full or limited ballast section is maintained in the intertrack space depends somewhat upon the track centers. On the principal multiple-track districts of the Illinois Central the track centers are 15 ft., providing ample space for two independent tracks with ballast cross sections as described above. Some of the advantages of this arrangement

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**Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, *Railway Engineering and Maintenance*, 79 W. Monroe St., Chicago 3, and reach him at least 30 days in advance of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed.**

## To Be Answered In the September Issue

*1. What is the most satisfactory method of governing the movement of track motor cars from the standpoints of safety and delays to work?*

*2. What are the essential structural and sanitary features of portable buildings for housing track and bridge and building forces moved periodically from place to place?*

*3. Should visual or audible means of communication be provided at outlying switches in C.T.C. territory to permit the C.T.C. operator to direct the track forces in the area to communicate with him? If so, what type of communication signals should be used? What are the advantages of such communication?*

*4. Should bridge and trestle ties be prebored for spike holes prior to being given preservative treatment? What are the advantages of such practice? Are there other means of obtaining the same ends? Explain.*

*5. What are the advantages of using recording machines in making periodic track inspections? How can the records obtained be used to the best advantage? Explain.*

*6. What is the recirculation method of water treatment? What are its advantages and disadvantages? Explain.*

*7. What are the advantages of timber connectors in railway building construction? Are there disadvantages? Under what circumstances is their use indicated?*

are: (1) Better drainage; (2) less ballast required with accompanying saving in labor to handle it and in work train expense; (3) less labor required to make tie renewals; (4) less labor required to smooth and line track; (5) adaptability to the operation of the scarifier-type of ballast drainage car or discing machine which equalizes the ballast section and establishes definite toe lines, thereby encouraging better "housekeeping" and a feeling of pride among supervisors; (6) affords a better opportunity of draining the intertrack space at low places where water is observed; and (7) less ballast to become fouled with dirt blown in from nearby plowed fields, droppings from cars and front-end cinders.

At places where men must walk and work between tracks the intertrack space is filled to within two inches of the tops of ties, with the shoulder ballast equalized on a flat slope to the midway line to draw water away from the tracks. This plan is followed through station grounds, train yards, interlocking plants, locomotive terminals, along sidings and at water and coal stations. We prefer chat ballast for these locations.

# Marking Curve Runoffs

*Do you designate, for the benefit of foremen, where and how much to elevate the track on the runoffs of curves? If so, what method do you use? Do you establish permanent markers? Explain.*

## Markers Aid Maintenance

By C. C. Van Stratten
Roadmaster, Missouri Pacific, Jefferson City, Mo.

To simplify the work of designating how the elevation should be run off on the spiral of curves, permanent markers should be used and so established as to be convenient for ready reference by the foreman. For these markers, we use an aluminum plate, 2 in. by 3 in. We place our first plate in the center of the track by nailing it to the crosstie at the beginning of the spiral, or E-00. At each station where the elevation increases ½ in. we place a tag showing the elevation at that point, and carry this method of marking on through to the point at which the full elevation of the curve is reached. On the full elevation tag, the degree of curvature is also stamped. In case of a compound curve the tags are also placed to show the change in degree and elevation.

This method has proved satisfactory in that the elevation at any point on the spiral can be checked quickly without measuring, thus leading to uniform maintenance of spirals and improved riding conditions.

## Fasten Metal Tags to Ties

By J. E. Chubb
Division Engineer, Pennsylvania Railroad, Toledo, Ohio

Our specifications for designating the amount and location of superelevation of the track on run-offs and spirals are very exacting. They prescribe that the elevation shall be marked with a tag at each stringline station on such runoffs or spirals and go so far as to specify, not only the exact location that the tags shall be placed on the tie with respect to the rail, but even such details as the shape and size of the tag, the fact that it must be made of monel metal or stainless steel, the size of the figures to be stamped on the tag, and the size and kind of nails that shall be used to fix it to the tie. When tie renewals are being made, the tags are removed from old ties, and are fastened to the new ties after they are installed.

Without such markers it would be almost impossible for the track foreman to know how much elevation should be carried at any point on the runoff or spiral. Obviously, he must know this if he is to maintain his tracks. Track foremen cannot be impressed too strongly with the importance of maintaining the correct elevation on both runoffs and curves to keep curves riding smoothly. Unless the foreman has the necessary information in the form of tags or other markers to designate the elevation that should be carried at every point on his curves, he has no guide by which he can check the accuracy of his work.

The suggestion has been made (and I believe it to be a good one) that elevations on spirals be designated at each ¼-in. change in elevation. Where speeds are not excessive and spirals are short, it is not uncommon to elevate spirals at the rate of ⅜ in. for every stringline station. It has been suggested that, in such cases, where the elevation to be carried at any stringline station must be stated in eighths of an inch, no tag be placed at that station but that a tag be placed one-third of the distance from such station in each direction toward the adjacent station. The elevation at such points can be expressed in quarters of an inch. For example, if the rate of change in a spiral is ⅜ in. per station and the point of level track is at station 1, then the tags should be placed as follows: Zero at station 1; ¼ at two-thirds of the distance from station 1 to station 2; ½ at one-third of the distance from station 2 to station 3; ¾ at station 3; 1 at two-thirds of the distance from station 3 to station 4, etc.

Where specifications require that tags be placed at the stringline stations, such a method cannot be followed, but it has the following advantages: (1) It permits the track foreman to set and read his level at quarters of an inch in every case instead of eighths of an inch in some cases. (2) It reduces by 50 per cent the number of different kinds of tags that must be carried in stock. (3) It gives the foreman more points on his spiral to check the actual elevation against the tags.

## Uses Special Tags

By John P. Hiltz, Jr.
Engineer Maintenance of Way, Delaware, Lackawanna & Western, Scranton, Pa.

The designation of the amount of super elevation to be applied to curves through the run-off is highly important, especially in high-speed territories. This designation should be accomplished through the use of permanent markers so that a track foreman, when surfacing, can pick up the proper elevation at any time and at any point on the curve.

We provide permanent markers through the use of elliptical aluminum tags, approximately 2 in. by 3 in. and about 1/16 in. thick on which is stamped the elevation in inches and fractions thereof. Each of these tags is securely fastened to a tie, with galvanized roofing nails, every 31 ft. (stringline station). All tags indicating the elevation in the run-off are placed at a specified distance from the rail in a specified direction, except that the one tag designating the full elevation is placed in a different location and direction. This latter precaution is taken so that a foreman will not apply the wrong super elevation to a curve if a full-elevation tag is missing.

# Choosing Aggregates for Concrete

*To what extent do unequal volume changes in the constituents of concrete contribute to its deterioration? From the standpoint of expansion, what kinds of aggregates should be avoided? Can this be determined readily? Explain.**

### Hard to Evaluate Effect

By L. H. Corning
Manager, Structural and Railways Bureau, Portland Cement Association, Chicago

I assume that the first part of this question refers to unequal volume changes in the constituents of concrete as a result of their physical properties. This includes thermal expansivity and volume change with wetting and drying, but not chemical reactivity.

Study has been given only recently to the effect of such volume changes on the performance of concrete structures. Out of the vast number of concrete structures in service few have exhibited trouble that could be attributed to unequal volume changes alone. Generally the cause is simply the failure to observe well-established fundamentals of good concrete making and correct construction methods. The possibility, however, of unequal volume change of the constituent materials being involved in failures is not being overlooked.

The durability of concrete depends on many factors, among which are the quality of the constituent materials. Failure of concrete has been attributed at times to unequal volume changes during wetting and drying, and to differences in thermal properties of the aggregate and cement, sometimes referred to as thermal incompatability. It is difficult to evaluate their individual effects on concrete, however, as they are interrelated with other deteriorative actions. For example, R. F. Blanks in a recent paper appearing in the April, 1949, proceedings of the A.S.C.E., states that "it is becoming continually more evident that failure of concrete commonly results from a combination of processes which, acting individually in comparable degree, would be ineffectual."

As regards wetting and drying, Roger Rhodes, chief geologist, Bureau of Reclamation, stated in a recent address that "the properties of principal importance in considering the effects of cyclical wetting and drying upon concrete are the volume change of the aggregates and cement paste and the compressibility, extensibility or rigidity of the aggregate and cement paste." Quoting again from the paper by R. F. Blanks, "concrete may be distressed by local expansions caused by excessive expansion of aggregate particles as they become wet; with drying, these same particles will contribute to excessive shrinkage. Further, particles that are especially compressible increase drying shrinkage because they fail to restrain the normal drying shrinkage of the cement paste. Clay minerals, of the montmorrillonite type (bentonitic), expand and contract significantly with wetting and drying." Rocks containing such material should be avoided for use as aggregate.

In considering the effect of thermal expansivity of aggregates, on concrete, the most important property of the aggregate is its coefficient of expansion. R. F. Blanks states in his paper that "aggregate particles with unusually low expansivities are more objectionable than are those with unusually high expansivity, since few rocks and minerals possess higher coefficients than hydrated portland cement." Common rocks, such as might be used for aggregates, differ widely in their thermal expansivity, ranging roughly from about $0.5 \times 10^{-6}$ to $9.0 \times 10^{-6}$ per deg. F. Portland cements in general vary within a narrower range, usually about $5.9 \times 10^{-6}$ to $9.0 \times 10^{-6}$ per deg. F. Several rocks fall in this category, including certain granites, limestones and marbles. Calcite and feldspar are the two rock-forming minerals which show the widest variation in coefficients of expansion. In general, it appears that rocks characterized by a lineal thermal expansion of $1.0 \times 10^{-6}$ or less per deg. F., should be avoided.

In concluding his paper, R. F. Blanks states that "many physical and chemical properties of aggregate affect the quality of concrete . . . More must be learned about the occasionally significant properties, such as thermal expansivity and the ability to shrink and expand with drying and wetting. Efficient and practicable tests of the fundamental properties of aggregates should be developed; yet, inevitably, economy will not permit application of complex tests to all aggregates proposed for use. Thus, petrographic examination may serve to establish the testing program necessary for each aggregate, with a view to measuring properties that cannot be estimated with sufficient accuracy."

It is apparent that the effect of unequal volume changes in the constituents of concrete on its durability is a complex problem. That it exists and that it is difficult to evaluate its effects from other deteriorative actions also is recognized. Some tests for determining rocks subject to unequal volume change when used as aggregate in concrete are in use. Research is being conducted to develop other tests for selecting aggregates.

*Additional material has been received on this question, but, because of its scope, it is being withheld for publication in a subsequent issue.

# Sludge-Blanket Water Treatment

*What is the sludge-blanket type of water treatment? Under what conditions is it best adapted? What are its advantages? Explain.*

### Adaptable to Small Space

By G. E. Martin
Superintendent Water Service, Illinois Central, Chicago

The sludge-blanket type of water treatment is sometimes used in connection with softening with lime and soda ash, as well as for clarification. Water treated with proper chemicals is brought into intimate contact with previously precipitated sludge particles. This assists in a more rapid and complete precipitation. Clarification is assisted by mechanical means, as the treated water passing through the area having concentrated sludge particles tends to filter newly formed precipitation particles from the water, rapidly producing water of low turbidity.

Several of the water-treatment companies are offering treating plants employing these principles and, although mechanical details differ somewhat, the basic principles are very similar. The capacity of such a plant depends upon the water-surface area rather than on volumetric capacity. The design rate has varied from less than one gallon per square foot up to two gallons per square foot per minute, and some have been operated satisfactorily at

rates as high as three gallons per square foot per minute.

There are several advantages that have been claimed for sludge-blanket type treating plants. The space required to install such a plant is considerably less than that for a conventional plant. The method of continuously removing the sludge from these plants is much better than dumping large amounts at long intervals, especially in those cases where it is necessary to dispose of sludge in a sewer. More complete chemical reaction is claimed for this type of treatment as compared with the conventional type. Consequently, there is some economy in chemicals purchased.

One the other hand, since mechanical agitation is essential in sludge-blanket plants they are subject to more rapid failure than plants not requiring continuous agitation. Furthermore, sludge-blanket plants require more adjustment than conventional plants, and experienced operators are desirable.

Sludge-blanket plants are best adapted to locations where ground space is limited, where weather conditions make housing of reaction tanks desirable, when economy in chemicals is desired, when sludge disposal in a sewer is desired, and at points where the chemical and physical characteristics of the water are not subject to rapid changes.

# Providing Employee Rest Rooms

*What are the essentials of adequate employee rest rooms at shops and terminals, especially as regards lockers, wash and sanitary facilities? Explain.*

## Design for Peak Loads

By L. C. Winkelhaus
Architectural Engineer, Chicago & North Western, Chicago

When providing rest room facilities for shop employees, due consideration must be given to the fact that practically all such employees start work at the same time, have identical lunch periods, and leave work together. Therefore, any such facility, particularly its wash rooms, must be designed for what may be termed peak loads.

Practically all sanitary codes state that toilet rooms must be separated from locker rooms by a solid wall. Some codes even call for wash rooms to be separated from locker rooms. It is general practice, however, to place the toilet and wash facilities in one room and the lockers adjacent thereto.

The locker room should be large enough to permit at least 4-ft., and preferably 5-ft., aisles between the rows of lockers. With adequate aisle space, benches can be placed between the rows of lockers for use of employees when changing clothes, or during lunch hour. In addition to the benches between the locker rows, a few small tables and accompanying benches should be available.

Steel lockers should be provided; in fact, most state codes demand them. The size of lockers used varies considerably, but in no case should they be less than 12 in. by 12 in. by 60 in. high. Lockers for trainmen and enginemen, and other road men, should be larger because these men are away from home overnight and sometimes for days. A satisfactory locker for such employees is 15 in. by 21 in. by 72 in. high, or 18 in. by 21 in. by 72 in. high. To show no discrimination, it is best to provide the same size locker for all employees. This also permits the shifting of lockers from one class of service to another. A locker should be provided with a hat shelf, clothes hooks, a hanger bar, and a ventilated door. It should also be possible to lock each locker with a padlock provided by the employee using it.

Inasmuch as shopmen wash up at the same time, it is preferable to provide circular-type wash fountains for them. Codes usually call for one wash space for every 10 men, or fraction thereof. However, in the case of shopmen, probably twice as many spaces should be installed and consideration given to reducing the number of showers. Shopmen usually want to go home as soon as possible.

For trainmen and enginemen the trough-type wash facility, with no drain stoppers, seems to be preferable. With this type of wash facility, each individual can temper the water to his desires and wash in running water. For this class of employee, the code requirements should be followed.

It is the modern practice to provide flush-type toilets with open front seats, and elongated bowls. Each water closet must be enclosed in a stall equipped with a door, paper holder, and a coat hook. Doors should be provided with latching devices. Urinals should be of the floor type and set so that water on the floor drains to them. This eliminates the expense of installing floor drains in toilet rooms.

All rest facilities must be provided with a drinking fountain, which must not be installed in the toilet room. Drinking fountains should be of the angle-stream type. In no case should a bubbler-type be installed. Of course, rest-room facilities should be properly heated and electric lighted, and have outside windows or skylights, to meet code requirements. Floors should be of concrete, and walls and ceilings should be plastered.

## Follow Sanitary Codes

By D. C. Teal
Sanitary Engineer, Chesapeake & Ohio, Richmond, Va.

There are in existence various national and state public health laws that prescribe, in a general way, the minimum requirements as to locker room and toilet facilities for shops and terminals. Railway shop craft and operating brotherhood agreements likewise include a paragraph or two on this subject.

Sanitary facilities for workers in the operating department, in shops and at terminals should consist of one or more clothes-change rooms containing lockers, lavatories and shower baths, and most important, providing an ample supply of hot water. Toilets should be in a nearby, but separate room. In a compact single-building shop, one change room located near the entrance should suffice. Plants spread out over large areas should have a change room inside each unit or in a separate building serving two or more shop buildings. Secondary toilet facilities consisting of urinals and lavatories should be provided at convenient locations so that the average worker need not walk over 200 ft. This distance may be increased to 300 ft. in areas where only a few men work. Separately housed toilets should be provided in yards for outside workers if the number of employees will justify them. Appropriate toilet and hand-washing facilities should also be provided for the office workers.

Refrigerated drinking fountains should be placed in each locker room and at other convenient locations if the number of employees served will justify the cost. However, these should never be placed in a toilet room.

Local state codes, where they are in force, specify the number of fixtures based on the maximum number of men on any 8-hr. shift required for any particular site. Most of these codes require a minimum of one wash bowl or wash facility for each 10 men or fraction thereof; one water closet for each 20 men or less; one urinal for each 50 men or less; and one shower stall for each 20 men or less. These minimum requirements should be adjusted to meet special local conditions and the class of employees to be accommodated.

The best equipped locker room in the country will soon become a most unsanitary place unless adequately maintained. Probably the most important essential of all is that sufficient men be assigned to keep things clean and that the responsible officers see that their work is effective.

# Crawl Spaces Under Buildings

*To what extent do proper design and maintenance of crawl spaces under buildings without basements minimize dry rot in wood floors and other parts of the structure? What other preventive measures are effective? Explain.*

## Must Be Ventilated

By L. E. Peyser
Architect, Southern Pacific, San Francisco, Cal.

Crawl spaces under wood floors in buildings having no basement are effective in minimizing dry rot in the wood sub-structure members in proportion as they provide adequate ventilation.

The situation most conducive to dry rot in lumber is one in which the material is subjected alternately to wet, or humid, and dry atmosphere in insufficiently ventilated enclosed areas. Ventilation of such areas should be so arranged that natural movement of outside air from any direction will result in a current being set up underneath the structure. Good results can be expected only where openings of ample size have been installed below the floor level on all sides of the building to permit effective escape of moisture. Such ventilating openings should be screened to exclude rodents.

Crawlways provide also an all-important opportunity for frequent regular inspections of the substructure. In the event dry rot occurs it can be seen during such inspections and corrective action taken before the rot reaches an advanced stage or is transmitted to superstructure members. In similar manner, crawlways aid in discovery and control of termite or other wood destructive insect infestation.

The mere fact that crawlways are necessary, however, indicates faulty design or insufficient forethought in most cases, since good practice would dictate that at points where floor levels are close to the natural grade a concrete slab or other resistive material on solid fill should be installed in preference to wood. Such construction is usually cheaper in first cost than wood and also results in lower maintenance cost. If this type of construction is impracticable or undesirable for any reason the wood substructure should be constructed entirely of treated materials to make it resistant to dry rot.

Should dry rot occur, necessitating removal of members, all material used for replacement should be treated, or, if the destruction is of considerable extent, then consideration should be given to the installation of a floor slab on fill.

## Crawl Spaces Cause Trouble

By Ralph R. Britton
Chief, Structural Section, Division of Standard Buildings Codes and Materials, Housing and Home Finance Agency, Washington, D.C.

Proper design and treatment of crawl spaces have not in the past been given the consideration to which they are entitled. Much of the trouble experienced in buildings, whether it be the rotting of floor timbers and the deterioration of other items under the first floor, or whether it be from condensation in attics and loft spaces, may be attributed to crawl spaces.

To many designers and maintenance men the differences to the building proper caused by the lack or the presence of a basement with a paved floor are of minor importance. This is especially true when insulation is used in the side wal's or top-story ceiling.

What happens under conditions where crawl spaces are closed all of the time or a major part of the time? Where the soil is wet and damp, as is common with clay and silt soils, the moisture is given off to the warm air. (It is not uncommon to run heating pipes in these spaces.) Relative humidities as high as 90 per cent, coupled with temperatures up to 80 deg. F., have been observed during severe winter weather.

Not many heating and maintenance engineers would consider it wise to try to confine air of such psychrometric properties in a space under a building. They know that warm air rises and that the pressure exerted by this air with its tendency to seek a higher level is not to be trifled with. This air will rise, and in so doing will come in contact with cold surfaces in walls, on piping, and in the attic or loft space. With many hard, cold-surfaced materials, condensation will occur and the condensate will drop back, causing damage and deterioration.

What is good practice in preventing trouble? In dwelling construction we recommend two methods: (1) By ventilation of the crawl space to the outside air; and (2) by covering the ground of the crawl space with a durable vapor resistant material. When the job is done by ventilation to the outside air, major good practice recommendations are:

(1) Total net* ventilation in an amount equal to 2 sq. ft. per 100 lin. ft. of perimeter of crawl space, *plus* one-third of 1 per cent of the area enclosed, should be provided in the walls of the crawl spaces.

(2) This ventilation should be well distributed around the perimeter, and be as high up as possible, with at least one ventilator near each corner.

(3) The ventilators should remain open throughout the year. This, of course, requires full consideration of insulated floors and mechanical lines in the crawl spaces.

When a suitable ground cover is used, good practice does not place so much dependence on ventilation in the crawl space. A waterproof concrete slab may be considered satisfactory.

An economical method, well adapted to corrective measures where floors are not insulated and where it would be expensive to pave the area, is to cover the ground with heavy asphalt roll roofing. Granular-surfaced or smooth-surfaced material weighing not less than 55 lb. per roll of 108 sq. ft. has performed satisfactorily for six years when in contact with the ground in the Washington, D. C., area.

Assuming the area to be covered is rough graded, 2-in. laps of this

*Where the ventilating area is obstructed with ⅛-in. mesh wire or ⅛-in mesh wire, the gross size should be 1¼ or 2 times, respectively, the net size obtained by using the formula. With ¼-in. wire mesh, no increase in size is necessary.

material, without cementing compound, will prevent the moisture from entering the crawl space. A small amount of ventilation is recommended, however, even with good ground cover.

My recommendation to railway officers is to investigate their crawl spaces. If pipes or steel beams are rusting, if wood is rotting, if wood moisture content is over 20 per cent (of oven-dry weight), or if there is condensation trouble in the attic or loft space, check the construction against the recommendations listed above and take corrective action.

# Using "Butterfly" Messages

*Is the use of "butterflies" while riding the rear ends of trains, the best way for a roadmaster or supervisor to notify track foremen of rough spots or other conditions needing attention? What other methods can be used? Explain.*

## Use Only For Emergencies

By F. L. Wilson
Roadmaster, Missouri-Kansas-Texas Lines, De Leon, Tex.

Most section foremen of today are experienced men and have their work planned for one or more days ahead. If they are notified by "butterfly" of a rough place, they will likely leave a job unfinished to go to make repairs. They will probably not have time to finish the second job, with the undesirable result of either two unfinished jobs, or two jobs poorly done.

Another thing against this method is its habit-forming tendencies. If you are in the habit of throwing butterflies, at least some of your foremen will get the habit of starting only those jobs they can leave on short notice—then wait for your butterfly to give them their instructions. This is an easy rut to get into. Foremen that are satisfied to do only what they are told to do are not good section foremen. Another disadvantage in this method is the fact that in giving instructions by butterfly, you must make the notes in a hurry and cannot explain any situation as you should.

I prefer to take notes and then write the foreman later. In most cases you can do this in a way that makes the foreman feel that he is deciding to do the job himself, and not feel that you are taking all the responsibility. I like to have my foremen feel that they are a "part of maintenance" and not a tool.

Copies can be made of letters written in this way, and filed for ready reference. One of the typical letters from my file reads, "You have a place . . . poles west of M.P. . . . that rides rougher than it looks. Wish you would look this spot over and see if you can find anything wrong with it." If I were a foreman and got that type of letter, I would check the spot over, find out why it rode rough, fix it, and know that I was doing my own thinking and the roadmaster was helping me to keep a check on places needing attention. Together we would get results.

## Use Is Limited

By J. P. Datesman
Engineer of Track, Chicago & North Western, Chicago

"Butterflies" have been used for many years by roadmasters and others to furnish information to section foremen, B. & B. foremen and signal department employees. However, such use of butterflies is limited, depending on whether or not the supervisor is making a round trip on his territory, or whether section forces or other crews have been passed by the train before the rough spot or other matter that the supervisor may wish to call to the roadway crew's attention has been passed by the train.

Bad rough spots noted by roadmasters as needing immediate attention should be brought to the attention of the section forces as soon as possible and, for this purpose, the use of butterflies is ideal if the section forces are located ahead of the train. However, I believe that butterflies should be used to call attention to emergency work only. Under ordinary circumstances a roadmaster, supervisor and other supervisory officer can make notes while riding over a territory and on returning to his office mail out the necessary information to the section forces.

I have learned from experience as a roadmaster that if butterflies are to be thrown from a train they should be thrown from the side and not from the rear. If they are thrown from the rear end of the train, air currents will cause the butterflies to follow the train, but if thrown from the side, they can be placed almost at a section foreman's feet.

## Use "Butterflies" Sparingly

By George S. Crites
Division Engineer (Retired) Baltimore & Ohio, Baltimore, Md.

Fifty years ago, an alert and ambitious foreman would seek a good roadmaster or supervisor to work for. To such a foreman, a "good" superior was one who would come out on the ground with him and explain in detail just what was needed to be done, as well as when and how it was to be done. The mutual planning and understanding of the two made emergencies in their territories few and far between and "butterflies" scarce, if not unknown.

Roadmasters or supervisors who did not have the knack of planning with foremen on the ground just how and when work was to be handled often tried to handle things on their territories by throwing notes from the rear of trains. This just suited foremen who could not stick to one task very long or who liked to move from place to place.

The art of good supervision has not changed much in 50 years. One of the surest ways to disrupt a track organization is to try to handle track work from the rear of trains, rather than on the ground with the foremen. It is true that occasionally an emergency may arise that necessitates immediate action on the part of a foreman and the supervisor is obliged to throw a note to him from a passing train, but if this is done it is the obligation of that supervisor to get on the ground as soon as he can.

It is also to be remembered that hurriedly written notes may not be too clear, and that the instructions carried thereby may be misunderstood. Once a supervisor, upon seeing a gang casting mud out of a cut with shovels, threw off a note reading, "Stop shoveling and go to wheeling." There was a political rally in the adjoining town of Wheeling so the foreman and his men went to the political rally.

A good roadmaster or supervisor must know his foremen and know his territory. He must know how best to get his instructions to each individual foreman in a manner that will insure that what is needed to be done is done correctly. "Butterflies" do not do that and should be used only in the absence of any other means of instructing foremen.

# PRODUCTS OF MANUFACTURERS

## New, improved equipment, materials, devices

*(For additional information on any of the products described in these columns, use postcards, page 655)*

### HOUGH BUCKET FOR CLEANING TRACKS

COLLABORATING with the Monongahela Connecting Railroad in the development of a fast, simple and economical method of removing accumulations of engine sand, dirt, debris, coal, ore and ashes from switch and yard tracks, the Frank G. Hough Company, Libertyville, Ill., has developed, for use with its Model HF Payloader, a special 72-in., ¾-yd. bucket, by means of which the machine can scoop up refuse from between rails and between tracks and carry and dump it directly into cars or trucks for disposal.

The bucket is constructed with a semi-cylindrical slot at its center, which permits straddling the rail in such a way that the cutting edge of the bucket can dig below the top-of-rail level. At the top of the slot there is a guide shoe with side flanges. This shoe rides the rail, limiting the digging depth of the bucket and keeping it centered over the rail. The shoe is adjustable for different heights of rails.

In cleaning a track the method of operation is to straddle the rail with the Payloader, lower the bucket to the desired cutting depth and travel along the track, scooping up the debris to a width of 3 ft. on each side of the rail to an even depth. When the bucket is full, it is raised to the carry position. The machine then travels to the car or truck, raises and dumps the load, and returns to repeat the cycle. Equipped with large pneumatic tires, the Hough Model HF Payloader crosses over rails readily.

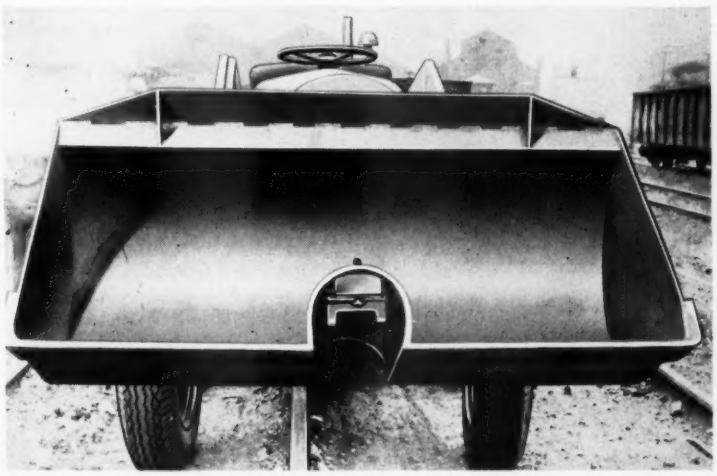
### BENBOW TOOL FOR TIGHTENING FENCES

THE Benbow Fence Tightener Company, Benbow, Cal., is introducing a new device for the simple, rapid and effective stretching or repairing of barbed-wire or woven-wire fences. The tightener is a piece of No. 4 steel wire (20 of them weigh about one pound) bent in such a way that when it is placed on a loose strand of fence wire and twisted by a tool which resembles a mechanics' speed wrench, it winds up the slack in the fence wire until the wire is stretched as tight as desired. When the wrench is removed from the tightener, the latter remains on the fence in a locked position.

**With the Benbow Fence Tightener either barbed-wire or woven wire fences can be stretched simply, rapidly and effectively**

Each tightener can take up as much as 12 in. of slack in a loose wire. If the full capacity of the tightener has not been used, additional slack can be wound up on it at any future time simply by slipping on the wrench and giving it a few turns.

**The Model HF Payloader and special track-cleaning bucket in operation**



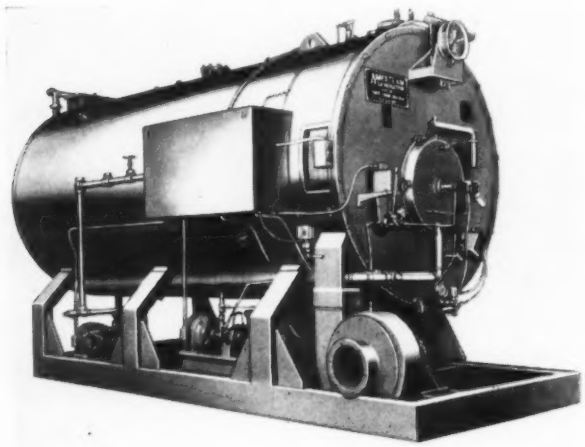
**The Hough bucket for cleaning yard tracks, showing the slot which permits straddling the rail**

*For additional information on any of the products described on this page, use postcards, page 655.*

The tightener does not kink the wire; the radius of the shank about which the wire is wrapped is sufficient to prevent breaking stresses even in badly rusted wire. The tool is especially useful in fencing over hills and across ravines because each strand of the fence can be tightened individually to conform to the contour of the ground.

## INTRODUCING THE AMESTEAM GENERATOR

AN OIL or gas-fired, fully-automatic steam-producing unit, called the Amesteam Generator, which requires no boiler-room labor, needs



A 150-hp. Amesteam generator

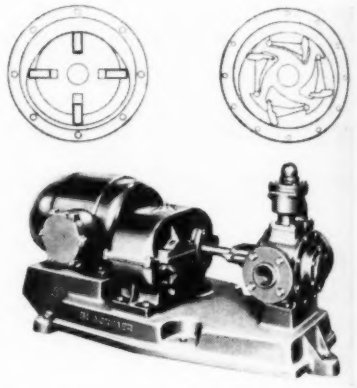
no chimney draft (only a simple vent to the atmosphere), produces no smoke or soot, and is guaranteed to have a thermal efficiency of more than 80 per cent, is being introduced into the railway field by Railway Supply and Equipment, Inc., Scranton, Pa. Available in boiler capacities ranging from 10 hp. to 400 hp., and in pressures from 15 lb. to 200 lb., the Amesteam Generator has a wide variety of railroad applications, such as the heating of stations, shops and other buildings, sand drying, Diesel de-icing and many others. It is manufactured by the Ames Iron Works, Oswego, N.Y. Railway Supply and Equipment, Inc., is exclusive distributor in the railroad field.

The unit is a modified type of Scotch marine boiler, baffled in such a way that all refractories are backed up with heavy steel supports, and so designed that it may be easily opened for boiler inspection or cleaning, or for repairs. Combustion in the generator takes place under positive pressure, a feature which aids in the breaking down of the fuel into a gas and mixing it thoroughly with the oxygen of the air. The air, moving at a velocity of more than 200 m.p.h., is introduced tangentially at two points in the combustion chamber, creating a cyclonic motion throughout the chamber. The centrifugal force of this motion prevents flame impingement on the heating surface of the furnace, thereby eliminating carbon soot deposits. The manufacturer and distributor both guarantee that exit gas temperatures from the unit will not exceed 150 deg. above the steam temperature in the unit.

All Amesteam generators are hydrostatically tested for pressure, and are fire tested at the factory to correct fuel and air settings. When delivered, therefore, they are completely assembled and ready for operation. With this generator it is said to be possible to produce steam at a cost of 75 cents to 76 cents per 1,000 lb.

## GREATER VERSATILITY FOR BLACKMER PUMPS

THE Blackmer Pump Company, Grand Rapids, Mich., has announced that a greater range of materials can now be handled by its line of rotary pumps. This has been made possible by the addition of a "sliding" vane type pump to the standard "bucket" or "swinging" vane type of pump. With the new pumps it is said that extremely viscous liquids (up to 100,000 Saybolt Seconds Universal) can be pumped successfully, and that gasoline and other volatile liquids can be pumped more efficiently and at higher lifts. For pumping certain non-volatile materials, however, and liquids containing solid and



**The addition of the "sliding" vane type (left hand drawing) to the Blackmer line of rotary pumps is reported to increase the range of materials that can be handled**

abrasive matter, the manufacturer recommends the "swinging" vane type.

The "sliding" vanes are positively actuated by push rods through the rotor and shaft. They can be furnished in a sound-deadening, non-metallic material which is said to have a greater resistance to wear than conventional metal vanes. Both "sliding" vanes and "swinging" vanes are self-adjusting for wear and can be replaced when necessary without disturbance to piping or drive.

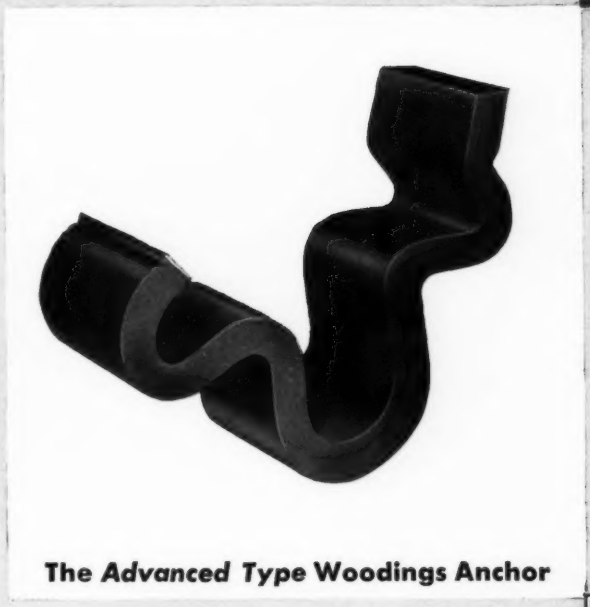
## LUFKIN CHAIN TAPE

THE Lufkin Rule Company, Saginaw, Mich., is introducing, for surveying work, a new chain tape called the Super Hi-Way. It is made of special spring-tempered steel and is heavily chrome plated to provide a

(*Continued on page 694*)

**The Lufkin Chrome-Clad Super Hi-Way tape which has a half-track-gage mark for convenience in railway surveying**

THE *WORLD'S MOST POWERFUL RAIL ANCHOR!*



The *Advanced Type* Woodings Anchor

**WOODINGS FORGE AND TOOL CO.**
VERONA, PA.
CHICAGO, ILL.

...ten to the *Railroad Hour* • *ABC Network* • *Monday Evenings*

*For additional information on any of the products described on this page, use postcards, page 655.*

hard, non-glaring, chrome-white surface which will not chip, crack or peel, and which strongly resists corrosion and wear.

The features of the tape include high accuracy; deeply etched black lines and figures which stand out sharply and are easy to read; improved end clips with reinforcing strips which help to prevent end-of-line breakage; and, for convenience in measuring from railroad tracks, a half-gage mark, 2 ft. 4¼ in. from the zero end of the tape.

The Super Hi-Way tape is available in three types of graduations and numbering. One of these is the "regular" type (C-9100 series), which has a blank space at each end, the first and last foot subdivided into tenths and hundredths of a foot, and the balance graduated every foot. Another type is the Style "A" (C-9100A series), with measurements beginning and ending at the extreme outer ends of the clips or rings, with the first and last feet subdivided into tenths and hundredths of a foot, and the balance graduated every foot. The third type is the Style B (C-9100B series), which has a blank space at each end, an extra foot before zero marked in tenths and hundredths, the last foot graduated in hundredths, and the balance graduated every foot. All these types are available in 100-ft., 200-ft. or 300-ft. lengths.

## J-40 JACKHAMER BY INGERSOLL-RAND

A medium-weight jackhammer capable of drilling in any kind of rock has been announced by the Ingersoll-Rand Company, New York. Known as the J-40 Jackhamer, the new machine is similar in design to the heavier J-50 model and contains many of its features, including powerful blows, strong rotation of drill steel and a fast drilling speed.

Other features of the machine include a "double-kicker" port valve which permits full air pressure on the piston for a longer period of time; a specially designed auxiliary port which allows full line air pressure to pass through the drill steel when the blower valve is open, resulting in a strong blowing action for cleaning deep holes; a design of the throttle valve and air-supply port which permits gradual admittance of

**The Ingersoll-Rand J-40 Jackhamer, a medium-weight tool capable of drilling in any kind of rock**

air into the cylinder, making the "collaring" of holes easier; a chuck driver fitted with a replacable bronze chuck nut which protects the piston flutes from scoring in case a drill is allowed to run dry of lubrication; a renewable bronze bushing in the piston stem bearing which takes the wear from the piston stem and prevents scoring; and a three-in-one backhead which enables the machine to be quickly adjusted for wet, dry or blower-type drilling. The J-40 Jackhamer was designed with Carset Jackbits (set with tungsten carbide inserts) in mind, and is especially suited for use with these bits.

## CHEMICAL KILLER OF WEEDS AND BRUSH

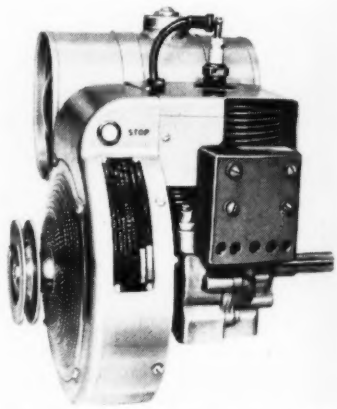
A WEED destroyer, which is reported to kill over 85 varieties of woody plants as well, has been announced by the American Chemical Paint Company, Ambler, Pa. Known as Weedone Brush-Killer 32, the formula contains, as active ingredients, the butoxy ethanol esters of 2,4,5-T and 2,4-D, the former composing 11 per cent of the formula and the latter 23 per cent. These two chemicals acting together are claimed to give better results in killing woody plants than 2,4-D alone, and at the same time are said to be less harmful to cultivated vegetation.

Weedone Brush-Killer 32 can be mixed with either oil or water for spraying. There is no danger of fire in its use, nor is there any record of livestock poisoning.

**A poison ivy plant which has been sprayed and killed by Weedone Brush-Killer 32**

## LIGHTWEIGHT GASOLINE ENGINE

THE Homelite Corporation, Port Chester, N.Y., has announced a 4-hp. air-cooled gasoline engine, known as



**The No. 20 Homelite engine which develops 4 hp. and weighs only 19 lb.**

the No. 20, for application where lightweight and compact size are important. It is 9½ in. long, 11½ in. wide, 13 in. high, and weighs only 19 lb.

Features of the engine include a two-cycle design with a minimum number of moving parts, die-cast aluminum alloys for all major castings, a single rotary intake valve which is self seating and requires no adjustment, no exhaust valves, a built-in governor which is part of the rotary intake valve, a simple float-feed carburetor with or without throttle, double-row ball bearings on the crankshaft and connecting rod, a needle bearing on the wrist pin, and a high-tension Wico magneto. The engine can be used in either a horizontal or vertical position.

*Under the Operating Conditions Which Confront You . . .*

# Can You Afford NOT to Use FABCO TIE PADS

*. . . Bridge Ties Switch Ties Station Ties and Ties on Curves*

With the high *INSTALLED* cost of ties today and their relatively short life under present volume of traffic at such critical points as bridges, switches, curves, and stations, the initial cost of *FABCO TIE PADS* will be repaid many times over. This saving results not only from extension of tie life, but also from the reduction in the cost of maintaining gauge, line, and surface.

*FABCO* is the ideal pad for this purpose because it withstands extremes of temperature, moisture, brine, mildew, and sand. It is resilient, maintains its original thickness without permanent set, eliminates the need of tightening spikes, and requires no renewals.

**IT PAYS TO SPECIFY FABCO TIE PADS**

*Made by the Makers of Fabreeka*

*Fifteen Years Experience in Track*

**FABREEKA PRODUCTS COMPANY INCORPORATED**

222M Summer Street, Boston 10, Mass.

# THE MONTH'S NEWS

## Happenings among the railways—the associations—the suppliers

## Changes in Railway Personnel

### General

**J. E. Teal,** transportation engineer on the Chesapeake & Ohio, with headquarters at Richmond, Va., has retired from active service.

**Charles J. Geyer,** assistant vice-president of the Chesapeake & Ohio, and formerly engineer maintenance of way of this road, has been elected vice-president—maintenance of way and construction, system, with headquarters as before at Richmond, Va.

**W. B. Barker,** chief engineer of the Southern Pacific of Mexico, has been promoted to assistant to president, with headquarters as before at Guadalajara, Jal., Mex.

**John Wagner,** manager of industrial development of the Reading at Philadelphia, Pa., and formerly supervisor of track on this road, has been appointed real estate agent with the same headquarters, succeeding **Willard W. James,** who has retired after more than 46 years of service. Mr. James was formerly valuation engineer of the Central Railroad of New Jersey.

### Engineering

**F. W. Tuxworth,** engineer of track of the Canadian National at Winnipeg, Man., has retired after 37 years of service.

**G. Lichtenwalner,** acting assistant engineer in the engineering department of the Grand Trunk Western, has been appointed assistant engineer with headquarters as before at Battle Creek, Mich.

**J. W. Thomas,** assistant to the division engineer of the Virginia division of the Seaboard Air Line, with headquarters at Raleigh, N. C., has been transferred to the Georgia division at Howells, Ga.

**V. S. Fowlow,** assistant division engineer, Montreal Terminals, of the Canadian National, has been promoted to division engineer of the Cochrane division, at Cochrane, Ont., succeeding **A. D. W. Cuthbert,** retired.

**A. K. Rountree** has been promoted from transitman on the Canadian Pacific at Toronto, Ont., to assistant engineer on the road's Montreal Terminal division, with headquarters at Montreal, Que.

**Paul O. Ellis,** superintendent on the Southern district of the Missouri-Kansas-Texas, at Muskogee, Okla., has been promoted to engineer maintenance of way of the M-K-T of Texas, with headquarters at Dallas, Tex., succeeding the late **James J. Gallagher,** whose death was reported in the June issue.

Mr. Ellis was born on May 2, 1892, at Erie, Kan., and attended the University of Kansas. He entered service with the Katy in 1910 as yard clerk, and was transferred later to the road's engineering department. In 1919 he was appointed accounting engineer at Dallas, and was head of the valuation bureau until March, 1923, when he was appointed yardmaster at McAlester, Okla. He was advanced to assistant superintendent, Southern district, in 1942, and later was transferred to Franklin, Mo. In November, 1946, Mr. Ellis was appointed assistant superintendent of safety at Dallas, and in February, 1947, became superintendent of safety. In May, 1949, he was appointed superintendent of the Southern district, the position he held at the time of his recent promotion.

Paul O. Ellis

**V. A. Bennett,** district engineer on the Northern Pacific at Livingston, Mont., and **H. F. Brown** also district engineer on the same road, with headquarters at St. Paul, Minn., have retired from active service.

**M. G. Harris,** chief draftsman, Chicago Terminal division, of the Pennsylvania, has been appointed assistant engineer, office of chief engineer maintenance of way, Western region, succeeding the late **P. S. Bazler,** whose death is noted elsewhere in these columns.

**J. F. Leonard,** engineer of bridges and buildings of the Central region of the Pennsylvania, with headquarters at Pittsburgh, Pa., who has been on a leave of absence since January 17, retired on July 1. Mr. Leonard was succeeded by **Frederick H. Lovell,** as announced in the February issue.

**C. R. Montgomery,** division engineer of the Eastern division of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been promoted to engineer maintenance of way of the Northern division, with headquarters at Buffalo, N. Y., succeeding **R. W. E. Bowler. J. W. Wallenius,** division engineer of the Long Island, Jamaica, N. Y., has been appointed division engineer of the Eastern division, succeeding Mr. Montgomery.

**T. W. Creighton,** assistant district engineer of the Canadian Pacific at Vancouver, B. C., has been promoted to district engineer, Manitoba district, at Winnipeg, Man., succeeding **W. L. Codington,** who has been granted a leave of absence because of illness.

**Joseph C. Brennan,** whose promotion to engineer of track of the Delaware & Hudson with headquarters at Albany, N. Y., was announced in the April issue, was born at Orange, N. J., on January 27, 1907, and received his civil engineering degree from Rensselaer Polytechnic Institute in 1929. He entered service with the D. & H., at Albany, as a draftsman on March 1, 1930, becoming a transitman on March 1, 1933, and was advanced to assistant engineer on May 1, 1941. On January 1, 1947, he was appointed assistant construction engineer, the position he held at the time of his recent promotion.

**Robert R. Pregnall, Jr.,** recently appointed division engineer maintenance of way on the Atlantic Coast Line at Rocky Mount, N. C., as noted in the May issue, was born in Charleston, S. C., on August 19, 1917, and graduated from The Citadel in 1939 with a B.S. in civil engineering. He began his railroad service as an instrumentman on the A.C.L., at Savannah, Ga., on May 1, 1946, advancing to junior engineer on July 1, 1946, and assistant engineer on February 1, 1947. He was appointed senior assistant engineer on September 1, 1947.

(*Please turn to page* 698)

# JOBS WANTED

## *for the Versatile*

## SCHRAMM MODEL 60 CRAWLER

## *Air Compressor*

. . . and AIR isn't the whole story . . .
The MODEL 60 is a many-purpose-machine

**Think of it! Even when you aren't using compressed air, there are lots of other jobs which the Schramm Model 60 Crawler can do. Hook on a backfill blade and fill small excavations. Run belt-driven machinery from its power take-off. And of course it's a mighty little tower and pusher too. Think of any other tasks? Just roll out your Model 60 Crawler!**

Below are some of the many compressed air jobs a railroad can have. The hard-hitting Schramm Model 60 Crawler is master of them all because it goes where the work is . . . no spot is inaccessible to its crawler treads. It's rugged. Compact, too . . . power as well as compressor cylinders are balanced in a single V-8 block. Finally, you can be sure of its complete dependability, for it is a product of America's exclusive compressor manufacturer. Get all the facts about the Model 60 Crawler from Schramm's Railway Sales Department. Request bulletin FC 48 today.

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## Railway Personnel (Cont'd)

**W. O. Cudworth,** special engineer on the Eastern region of the Canadian Pacific, with headquarters at Toronto, Ont., retired recently after 41 years of service.

**H. M. Booth,** division engineer of the St. Louis-San Francisco, with headquarters at Springfield, Mo., has been appointed division engineer at that point with jurisdiction over the Rolla, Lebanon and Springfield sub-divisions, Eastern division, including the St. Louis, Mo., and Springfield terminals. **H. F. Busch,** division engineer at Memphis, Tenn., has been transferred to Springfield, with jurisdiction over the Clinton, Willow Springs and Memphis subdivisions, Eastern division, including the Memphis terminal. **G. L. Harris,** division roadmaster at Amory, Miss., has been promoted to division engineer at Yale, Tenn., with jurisdiction over the Southern division, including the Birmingham (Ala.) terminal.

**Ashley G. Hibbard,** whose promotion to division engineer of the Montreal Terminals division of the Canadian Pacific at Montreal, Que., was announced in the May issue, was born in Sillery, Que., on December 2, 1914. He received his B.A. degree from Bishops University, Lennoxville, Que., in 1935, and graduated in civil engineering from McGill University, Montreal, in 1941. Mr. Hibbard entered railroad service with the Canadian Pacific as a draftsman on May 5, 1941, being advanced to bridge inspector on September 1, 1945. He served as assistant engineer on the Laurentian division from February 7, 1947, to December 1, 1947, when he was transferred to the Montreal Terminals division in the same capacity. On March 1, 1948, he was appointed assistant roadmaster, with the same headquarters, and advanced to roadmaster on the Smiths Falls division at Ottawa, Ont., on October 15, 1948, where he remained until his recent promotion.

**William H. Hoar,** assistant division engineer of the Southern at Birmingham, Ala., has been appointed division engineer at Hattiesburg, Miss., where he succeeds **John F. Barron,** who has retired. Mr. Hoar was born at Millis, Mass., on February 16, 1905. He entered the service of the Southern in June, 1939, as assistant engineer in the office of the chief engineer at Washington, D. C., and served in that capacity until May, 1943, when he was furloughed for military service. He returned to the railway in January, 1946, as assistant engineer of bridges in the office of chief engineer maintenance of way, at Cincinnati, Ohio, where he remained until February, 1947, at which time he was appointed to the position which he held until his recent promotion.

**J. S. Knight,** assistant regional engineer of construction and maintenance of the Baltimore & Ohio Chicago Terminal, has been promoted to regional engineer, with headquarters as before at Chicago, succeeding **Guy P. Palmer,** who has retired after 47 years of service with the B. & O. Mr. Palmer was born on March 29, 1883, at Winchester, Mass., and received his higher education at the Massachusetts Institute of Technology, from which he was graduated in 1904. He entered railroad service with the Baltimore & Ohio on June 10, 1902, while on vacation from school, as assistant in the engineering corps, and served in the same capacity the following summer. Following graduation, on February 25, 1905, he returned to the B. & O. in its engineering corps at Chicago, and on April 1, 1910, entered the service of the B. & O. C. T. as assistant engineer, the B. & O. having just taken over control of that property. On March 1, 1911, Mr. Palmer became division engineer of the B. & O. C. T.; on September 1, 1918, he was appointed engineer, maintenance and construction; and on July 1, 1945, he was further advanced to regional engineer, construction and maintenance.

**Guy Prescott Palmer**

**John S. Knight**

Mr. Knight graduated in engineering at Ohio State university, 1910. Prior to entering railroad service he was employed for a short time by the State of Ohio. He joined the Baltimore & Ohio in 1910 as a rodman, which post he held until 1915, when he was transferred to the B. & O. C. T. as assistant division engineer at Chicago. From 1918 to 1924, he worked in Baltimore, Md., but returned to Chicago in the latter year as principal assistant engineer in charge of construction on the Chicago River straightening project. Mr. Knight was appointed assistant regional engineer in 1945, in which capacity he was serving at the time of his promotion.

### Track

**W. Paul Higginbottom,** track supervisor of the Southern at Huntsville, Ala., has been transferred to Buntyn, Tenn.

**Albert A. Witter** has been appointed supervisor of trains and tracks on the Bloomington and Pontiac districts of the Illinois Central at Kankakee, Ill.

**W. Granville Fletcher,** track supervisor of the Southern at Appalachia, Va., has been transferred to Gate City, Va., where he succeeds **F. Vaughn Patrick,** who has been transferred to Clinton, Tenn.

**J. G. Fry** has been appointed roadmaster on the Enid, Stillwater and Cushing districts of the Atchison, Topeka & Santa Fe, succeeding **G. H. Truman,** who has been assigned to other duties.

**James A. Pollard** has been appointed roadmaster of the Delaware, Lackawanna & Western, with headquarters at Binghamton, N.Y., succeeding **J. J. Best,** deceased. **Thomas J. Ward** has been appointed supervisor of track with headquarters at Hoboken, N. J., and **James C. Wallace** has been appointed acting supervisor of track at Port Morris, N. J.

**R. H. Smith,** supervisor of track on special duty in the office of the comptroller of the Pennsylvania, Philadelphia, Pa., has been appointed supervisor of track at Reading, Pa., where he succeeds **T. C. Netherton,** who, in turn, replaces Mr. Smith on special duty.

**V. F. Grubaugh,** supervisor of track on the Logansport division of the Pennsylvania at Logansport, Ind., has been transferred to the Fort Wayne division, at Lima, Ohio, to succeed **E. B. Kirchner** who has retired. **W. H. Lindsay, Jr.,** assistant supervisor on the New York division, succeeds Mr. Grubaugh. **T. T. Trax,** assistant supervisor of the Columbus division at Columbus, Ohio, has been transferred to the New York division to replace Mr. Lindsay, and has been succeeded by **W. J. Nichols, Jr.,** junior engineer on the Eastern division. **P. A. Mainquist,** assistant supervisor of track on the Eastern division of the Pennsylvania, has been promoted to supervisor of track on the New York division with headquarters at Trenton, Pa., succeeding **J. V. Adams,** who has been transferred to the Maryland division at Baltimore, Md., to replace **C. J. Webb,** whose appointment as supervisor of the company's reclamation at Chambersburg, Pa., is noted elsewhere in these columns. **R. C. Kleffman,** assistant supervisor on the Cleveland division, has been transferred to the Eastern division to replace Mr. Mainquist, and **R. F. Cole,** junior engineer on the Fort Wayne division, has been appointed assistant supervisor to succeed Mr. Kleffman.

*(Please turn to page 700)*

# "I HAD TO FIGHT FOR 'HERBICIDOL' THIS YEAR"

"I TOLD THE BOSS THE MONEY WE SPENT IN APPLYING IT OVER THE PAST THREE GROWING SEASONS WAS THE BEST MONEY THIS RAILROAD EVER INVESTED AND OUR TRACK IS IN THE BEST CONDITION THAT IT HAS BEEN IN SINCE I CAME ON TWENTY-FIVE YEARS AGO."

Statements like this one from men who have come up the hard way and now head up the maintenance department, is convincing evidence of the value of READE'S WEED CONTROL SERVICE.

The more railroads observe the results in using "HERBICIDOL", the more they observe the unique properties of this particular product.

Water soluble oil base chemical weed killer has proved its license to exist. It has proved that it has properties that water soluble chemicals alone cannot contribute.

Its ability to utilize and combine both water and oil soluble raw materials permits of incorporating any new raw materials that prove to have desirable properties for weed control work.

It permits further of utilizing the powerful effect of poisonous base weed killer, and of incorporating other raw materials that discourage the approach of livestock.

**"HERBICIDOL" is available in both poisonous and non-poisonous types.**

**COST PER GALLON IS LOW.**

**QUANTITIES REQUIRED PER MILE ARE NOMINAL.**

**Both of which assure a good job at low cost per mile.**

**A REVIEW OF YOUR WEED CONTROL PROBLEM IS SUGGESTED.**

## READE MANUFACTURING COMPANY, INC.

*Executive Headquarters*
**135 Hoboken Avenue**
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***PLANTS IN NUMEROUS RAILROAD CENTERS***

**You will like these features of OLIVER DRIVE SPIKES**

**Save labor and ties.**

**They turn as they are driven into prebored holes, cutting their own threads. Not screwed in.**

**Spikes with straight necks can be used with or without washers.**

**Cone neck spikes—furnished in same sizes—wedge firmly into tie plate, preventing motion in any direction.**

**Driving-turning action does not injure wood fibres; avoids tie splitting.**

**May be removed by turning back out of timber, and reused.**

***To anchor tie plates tightly and permanently, use***
**OLIVER DRIVE SPIKES!**

OLIVER
IRON AND STEEL
Corporation

**South Tenth and Muriel Sts. · Pittsburgh 3, Pa.**

## Railway Personnel (Cont'd)

**Frank Aikman, Jr.,** formerly supervisor of track on the Pittsburgh division of the Pennsylvania, with headquarters at Derry, Pa., who resigned in 1946, to go with the Railroad Siding Construction Co., Pittsburgh, Pa., has been appointed engineer maintenance of way of the Long Island, with headquarters at Jamaica, N. Y., where he succeeds **J. W. Wallenius,** whose appointment as division engineer of the Eastern division of the Pennsylvania appears elsewhere in these columns.

**B. H. Lester,** assistant roadmaster on the Norfolk division of the Norfolk & Western, with headquarters at Crewe, Va., has been appointed roadmaster at Pulaski, Va., succeeding **Henry T. Huff,** who retired on June 1. **R. F. Dunlap,** inspector in the office of the manager roadway maintenance, has been promoted to assistant roadmaster with headquarters at Crewe, succeeding Mr. Lester.

### Bridge and Building

**J. A. E. Girard,** assistant bridge and building master on the Cochrane division of the Canadian National at Cochrane, Ont., has been promoted to bridge and building master, with the same headquarters, succeeding **J. L. McAllister,** retired. **J. Alyre Bergeron,** bridge and building foreman on the Laurentian division has succeeded Mr. Girard.

### Special

**C. J. Webb,** supervisor of track on the Maryland division of the Pennsylvania, with headquarters at Baltimore, Md., has been appointed supervisor of the company's reclamation plant at Chambersburg, Pa.

**Olav Asberg,** assistant agent of land and claims of the Northern Alberta Railways, has been promoted to agent of land and claims with headquarters in Edmonton, succeeding **George A. Latter,** who retired March 31 after 33 years of service.

### Obituary

**Carl R. Beck,** chief masonry inspector of the Illinois Central with headquarters at Chicago, died on April 7.

**James A. Turner,** who retired in 1943 as roadmaster of the Jacksonville district of the Atlantic Coast Line, after 42 years of service, died on April 27.

**W. J. Mallon,** superintendent, way and structures, of the Chicago, South Shore & South Bend, with headquarters at Michigan City, Ind., died recently.

**P. S. Bazler,** assistant engineer, office of chief engineer maintenance of way, Western region, of the Pennsylvania, died recently.

(*Please turn to page* 702)

# PRECISION ACTION
## cleans ditch bottom without destroying sodded slopes!

PICTURED SEQUENCE SHOWS HOW QUICKLY AND EASILY THE GRADALL MACHINE DOES A JOB THAT FORMERLY NECESSITATED MANUAL LABOR

**1.** The 6 ft. wide, ½ cu. yd. bucket is starting its precision cut.

**2.** The hydraulic boom, working with the skill of a giant arm, takes a skim cut from the bottom of the back slope. The muck is cleaned from the bottom, and a skim cut taken from the lower end of the front slope—lifting it free without disturbing sod.

**3.** The Gradall swings and wastes the muck.

**4.** The arm-action boom levels the waste evenly over the surface before returning for another cut. No additional equipment is needed.

How a major railroad uses one of its several Gradalls to clean bottom of a 7½ ft. drainage ditch without harming sodded slopes or disturbing surrounding area is of interest to all construction men. Many jobs in close proximity to curbs, side walls, tree, lawn or building,—or in excavating around buried pipe or tanks, ordinarily need hand work in addition to machines. But the Gradall arm action insures accuracy and neatness that makes costly, time-taking hand labor unnecessary for almost all jobs. The Gradall's remarkable precision, versatility, and maneuverability return big profits.

Gradall Reg. U. S. Pat. Off.

GRADALL DIVISION
WARNER & SWASEY
Cleveland

GRADALL—THE MULTI-PURPOSE CONSTRUCTION MACHINE

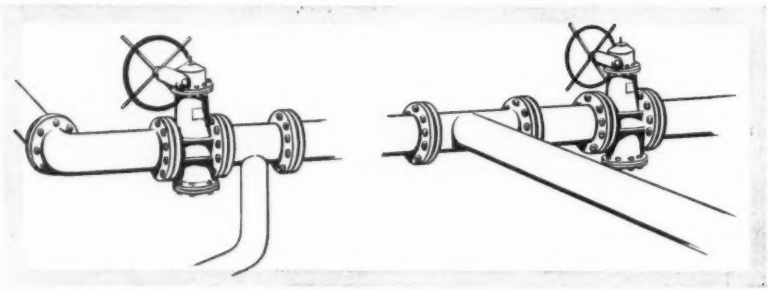
## Railway Personnel (Cont'd)

**C. J. Fogelgren,** retired track supervisor of the Erie, died April 9.

**R. W. Mabe,** assistant chief engineer of the Nashville, Chattanooga & St. Louis, with headquarters at Nashville, Tenn., was killed on June 10, when his own light plane crashed in Summer County, Ky. A photograph and biographical sketch of Mr. Mabe were presented in the issue of December, 1948.

**W. D. Wiggins,** retired vice-president-engineering of the Pennsylvania died June 12 at the Bryn Mawr (Pa.) Hospital after an illness of several weeks. Mr. Wiggins, who was 76 years of age, had retired in April, 1943, after 48 years of service. A native of Richmond, Ind., he entered railroad service in 1895 as a rodman on the engineering corps of the Pennsylvania, following his graduation from Rose Polytechnic Institute. In 1912, after varied experience in maintenance of way and construction work, he was advanced to superintendent of the Peoria division. Through subsequent promotions he became valuation engineer of the former Pennsylvania Lines West of Pittsburgh; chief engineer maintenance of way, Central Region; assistant chief engineer; chief engineer of the Central Region, and, in 1935, chief engineer of the system at Philadelphia. On February 1, 1943, he was advanced to vice-president, engineering.


# No . . . Your WATER SUPPLY LINES are not actually broken this way



**Loss of carrying capacity in water supply systems is costing YOU many dollars every year.**

**The need for additional pumps in many cases is due to friction loss—leakage—obsolescence—incrustation—unrecorded take-off—increased demand—all of which cause this costly loss of carrying capacity.**

**Data collected by research groups over the past ten years is so accurate that, given the source of water supply and the age of the pipe, a reasonably accurate estimate of loss of carrying capacity can be made without an examination.**

**The Pittsburgh Pipe Cleaner Company Engineering Department has specially trained hydraulic engineers to make these estimates for you. Write Today.**

And **NOW**—agents for the Gates Engineering Co., offering expert application of the following plastic coatings to reduce corrosion: **GACO-NEOPRENE—GACO-NEOFLEX — GACO-NITRO-COTE — GACO-DURAFILM —GACO-"316."**

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# Association News

### Metropolitan Maintenance of Way Club

The annual outing of the club was held at the Out O' Bounds Country Club, Suffern, N. J., on June 16. The affair was attended by 230 members and guests, who participated in golf, soft-ball, horseshoes, quoits and other sports. A picnic-style lunch was served.

### American Railway Engineering Association

Only three standing committees have scheduled meetings to be held in July. The Committee on Water Service and Sanitation will meet at the association's headquarters at Chicago on July 12, the Committee on Iron and Steel Structures will meet at Cincinnati, Ohio, on July 27 and 28, and the Committee on Economics of Railway Labor will make a two-day inspection trip over the Pennsylvania, beginning at Philadelphia, Pa., on July 12. On the afternoon and evening of that day the committee will hold a business session at the Bellevue-Stratford hotel at Philadelphia.

J. L. Beckel, vice-chairman of the Com-

### Meetings and Conventions

**American Railway Bridge and Building Association**—Annual meeting, September 12-14, 1949, Hotel Stevens, Chicago. Elise LaChance, Secretary, 431 S. Dearborn street, Chicago 5.

**American Railway Engineering Association**—Annual Meeting, March 14-16, 1950, Chicago. W. S. Lacher, secretary, 59 E. Van Buren street, Chicago 5.

**American Wood-Preservers' Association**—H. L. Dawson, secretary-treasurer, 1429 Eye street, N.W., Washington 5, D.C.

**Bridge and Building Supply Men's Association**—E. C. Gunther, secretary, 122 S. Michigan avenue, Chicago 3.

**Maintenance of Way Club of Chicago**—Next meeting, October 24, 1949. E. C. Patterson, secretary-treasurer, Room 1512, 400 W. Madison street, Chicago 6.

**Metropolitan Maintenance of Way Club**—Walter L. Turner, Jr., secretary, 30 Church street, New York.

**National Railway Appliance Association**—R. B. Fisher, secretary; Lewis Thomas, assistant secretary, 59 E. Van Buren street, Chicago 5.

**Railway Tie Association**—Annual convention, September 12-14, 1949, Peabody Hotel, Memphis, Tenn. Roy M. Edmonds, secretary-treasurer, 610 Shell Building, St. Louis 3, Mo.

**Roadmasters' and Maintenance of Way Association of America**—Annual meeting, September 12-14, 1949, Hotel Stevens, Chicago. Elise LaChance, secretary, 431 S. Dearborn street, Chicago 5.

**Track Supply Association**—Lewis Thomas, secretary, 59 E. Van Buren street, Chicago 5.

mittee on Iron and Steel Structures (assistant engineer of structures, New York Central System), has been appointed chairman of that committee to replace R. W. Mabe (assistant chief engineer, Nashville, Chattanooga & St. Louis), whose accidental death on June 10 is reported in the news columns of this issue.

### Track Supply Association; B. & B. Supply Men's Association

Acting jointly these associations will tender a banquet to the members of the Roadmasters' Association and the American Railway Bridge and Building Association on the evening of September 13, during the concurrent annual conventions of the two associations at the Stevens hotel, Chicago. To make preparations for the banquet, two committees have been established by the supply groups—an Entertainment committee and a Publicity committee. The latter committee held a meeting on June 24 and the Entertainment committee plans to meet early in July.

### Roadmasters' Association

Final arrangements for the annual convention to be held at the Stevens hotel, Chicago, on September 12-14, will be made at a meeting of the Executive committee that is to be held at the Chicago Engineers' Club on Monday, July 11. Chairmen of the technical committees are invited to be present at the meeting, and to submit "previews" of their reports. As in recent years, the convention will be held concurrently with that of the American Railway Bridge and Building Association. It is planned to have at least two joint sessions of the two groups to hear addresses of common interest. Another joint feature will be the annual banquet, to be held on Tuesday, September 13, which will be sponsored for the benefit of the two groups by the Track Supply Association and the Bridge and Building Supply Men's Association.

### B. & B. Association

The Executive committee of the association has scheduled a meeting to be held at the Chicago Engineers' Club on July 15 to make final arrangements for the program of the annual convention to be held at the Stevens hotel, Chicago, September 12-14. As in recent years the convention will be held concurrently with, but independent of, that of the Roadmasters' Association. While the meetings will be entirely separate there will be at least two joint sessions and also a banquet. The latter affair, to be held on September 13, will be sponsored jointly for members of the two associations by the Bridge and Building Supply Men's Association and the Track Supply Association.

Another item of business on the agenda of the Executive Committee meeting on July 15 will be to review the committee reports. For the purpose of presenting their reports the chairmen of the technical committees have been invited to attend the meeting.

(*Please turn to page* 704)

JUDGE
"'Tain't fair—he's standing on slip-resistant 4-WAY Safety Plate!"
Yes, Inland 4-WAY Safety Plate provides superior slip-resistance—built-in *safety*. Install it wherever feet or wheels must go—on floors, steps, platforms—in your plant or on your product. Made of steel, it lasts for years. INLAND STEEL CO., 38 South Dearborn Street, Chicago 3, Illinois.
WRITE FOR BOOKLET
Inland
4-WAY*
STOCKED BY LEADING STEEL WAREHOUSES
SAFETY PLATE
*Reg. U. S. Pat. Off.

New Light Weight POWER FOR FASTER TRACK WORK

Aluminum Alloy

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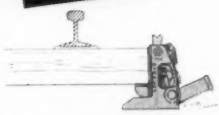
UNIVERSAL TRACK JACK

Speeds

TAMPING—BALLASTING



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Greater portability—weighs only 28 lbs.—with no sacrifice of strength, makes this jack a "must" for maintenance-of-way crews doing more work faster. Simplex No. A5 has 15 tons capacity, large forged toe lift surface of 2½" x 3¼". Simplex-engineered, aluminum alloy housing, reinforced at stress points, has the strength of malleable jacks weighing 45% more!

• SIMPLEX A17 TRACK JACK

Aluminum Alloy Housing—41½ lbs. Light—15 Tons Strong!

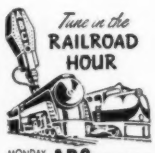
For general track jacking. Built with 40% extra support at stress points to equal strength of malleable jacks that are 45% heavier! Large toe lift area (2½" x 3¼") permits jacking under ends of ties without damage. Shorter fulcrum center. Safety thumbguard. Lifts full capacity on cap or toe! Height 22¾" with 13" lift.

SIMPLEX RAIL EXPANDERS

One man with No. 550 replaces rail pounding crew. Avoids battered rail ends, bolts or crossings. Easy to operate. 25 tons capacity. (Also available in two other models of 15 and 30 tons capacity.)

SIMPLEX SAFETY JACK SUPPORTS

Made of aluminum alloy. Only four needed to handle safely the heaviest structure. Far stronger than wooden wedges. Use as shown or inverted with Simplex Standard Speed Journal or Bridge Jacks.

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# Supply Trade News

## General

The **Simmons-Boardman Publishing Corporation,** publishers of *Railway Engineering and Maintenance* and other railroad periodicals and books, has moved its Chicago office from 105 West Adams street to 79 West Monroe street, Chicago 3. The telephone number continues to be Randolph 6-0794.

The **Homelite Corporation,** Port Chester, N. Y., has opened a new branch office in Pittsburgh, Pa., to cover western Pennsylvania, West Virginia and eastern Ohio, territory formerly covered by the Koontz Equipment Corporation. The new office is located at 810 Ridge avenue, with **William B. Livingston** in charge.

**Railroad Supply & Equipment, Inc.,** a newly formed company, with offices at 148 Adams avenue, Scranton, Pa., has announced that it has been appointed sole distributor to the railroads of the United States of the Amesteam Generator, a product of the **Ames Iron Works,** Oswego, N. Y. The new company is qualified to assist in the engineering and design of boiler rooms for the steam generator, and to supervise the installation and maintenance of the unit. The officers of the company are **Arthur R. Frampton** and **Edmund J. Heberger.**

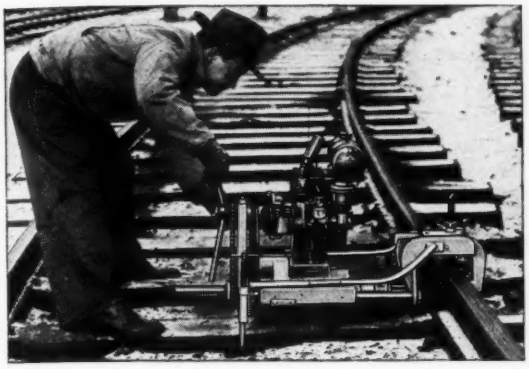
The **Thew Shovel Company,** Lorain, Ohio, which has grown since its incorporation in 1899 to five plants employing 1,500 workers, will celebrate its 50th anniversary on July 17. The firm's history actually began four years earlier in 1895, when Captain Richard P. Thew, then captain of an ore-carrying lake boat, designed and built the first Thew shovel.

The **Worthington Pump & Machinery Corp.,** Harrison, N.J., has announced the expansion of its Water Treating Equipment Sales division and the transfer of that division to the corporation's Dunellen Works at Dunellen, N.J., effective June 20. The transfer is being made from the Harrison Works, where this equipment has been produced for the past ten years, because of increased activity in this field and the fact that the Dunellen Works production facilities are particularly well suited to this type of manufacture.

The products involved in the transfer are hot-process water softeners of both deaerating and non-deaerating types; cold process slurry type of softeners and coagulators; Zeolite softeners, including deionizing systems; and pressure filters for general purpose filtration. It is anticipated by officers of the company that the move will facilitate service to customers, as well as resulting in improved shipment through better coordination of engineering, research, sales and production departments.

(*Please turn to page* 706)

# DRILL A HOLE A MINUTE AND *SAVE*



## . . . with the P-43 Power Track Drill

Yes sir, the P-43 drills holes up to 1½-in. in 60 seconds, but that's not all. Check these economical operating features and you'll agree that the P-43 is bound to cut track costs.

- Perfect alignment for drilling through angle bars or bare rails assured by leveling adjustments on top of rail head and by supporting screws.
- Positive, easily controlled screw feed.
- V-belt drive from 1½ hp air-cooled engine acts as overload release in case drill cramps or sticks.
- Telescopic extension on rail-head bracket permits drilling at switch heels.
- Chuck jaws automatically remain open when loosened for changing bits.
- Extensive use of aluminum casting makes drill light and easy to handle.
- Adjustment provided for tightening V-belts.

*Write for full information on the P-43 and other efficient and economical RTW maintenance equipment.*

**Railway Trackwork Co.**

**3207 KENSINGTON AVE., PHILADELPHIA 34, PA.**

AGENTS FOR

**THOR Independent Tools • LeRoi Air Compressor • Dapco Paint Sprayer • Chicago Latrobe Drills & Bits • Track Grinding Wheels**

5472

# BEALL Hi-Duty SPRING WASHERS

BEALL Hi-Duty SPRING WASHERS are made especially to stand the strain of the heavy-duty rail service required by today's high-speed freight and passenger trains.

We control every step of their manufacture — from the specification of the specially-developed formula and process used in making the steel to the forming, hardening, tempering and testing operations.

Their dependability has been proven by years of actual service on hundreds of railroads.

***made especially for Railroad Service***

BEALL HI-DUTY SPRING WASHERS, being made especially for railroad service are strong and tough, yet provide the necessary "springing action" required at rail joints, frogs and crossings.

**BEALL TOOL DIVISION** (HUBBARD & CO.)
*SPECIALIST MANUFACTURERS OF SPRING WASHERS*
140 Shamrock St., EAST ALTON, ILL.

## Supply Trade News (Cont'd)

The **Air Reduction Company,** New York, has announced the opening of a new oxygen plant at Flint, Mich., built at a cost of more than $250,000. In addition to the manufacture of oxygen, the new facility will be a supply point for acetylene gas and welding equipment and supplies. The company has also announced the opening of a new acetylene plant in Acton, Mass. Built to serve the New England area, this plant has a rated capacity of 100,000 cu. ft. of acetylene per day. **A. L. Beck** is the plant superintendent. This company has also established a new warehouse point in Tulsa, Okla. The warehouse will be located with the Fidelity Transfer & Storage Co., 1540 East Fifth street, and will carry supplies of oxygen and acetylene gas.

**The International Steel Company,** Evansville, Ind., eighth largest fabricator of steel, by tonnage, in the country, has formed a Railway division to manufacture and market railway products. These products are primarily for application on rolling stock, but in addition the company will furnish sectional buildings for use as oil-storage depots and shop and service buildings, which may be dismantled and relocated with 100-per cent salvage of the original material.

In charge of the Railway division will be **Walter G. Koch,** senior vice-president, and **Wesley D. Hamilton,** vice-president, reporting to President **Henry Bohnsack.** The railway division recently retained as consultant, **K. F. Nystrom,** retired chief mechanical officer of the Chicago, Milwaukee, St. Paul & Pacific.

The **Independent Pneumatic Tool Company** recently constructed four new factory branch sales and service buildings at 1405 West Washington boulevard, Chicago; 32-34 Greenpoint avenue, New York; 204 Thomas street, Pittsburgh, Pa.; and 1909 Davenport road, Toronto, Ont. The new buildings replace previous office sites in the same cities. The export division will continue to be located at 330 West 42nd street, New York.

Dedication ceremonies were held at Manville, N.J., on May 24 for a research center that has been constructed there by the **Johns-Manville Corporation.** Several hundred distinguished scientists, engineers, builders, diplomats and dignitaries from other walks of life were on hand to participate in the ceremonies and to inspect the facilities. These consist principally of four buildings located on a 93-acre tract on the Raritan river about 40 mi. from New York.

The new center is devoted to research activities aimed at the improvement of existing Johns-Manville products and the development of new products to meet new needs and demands of industry and individuals. The research center is said to embody a completely new concept of industrial laboratory design and construction. This includes laboratories with relocatable walls and built-in services that are reported to make them as flexible as movie sets, and product-development areas that include as many as 10 pilot plants under one roof in close proximity to the laboratories associated with their products. This arrangement is said to permit close cooperation of scientist-technician "teams" or "task forces" from ideas to commercial production.

## Personal

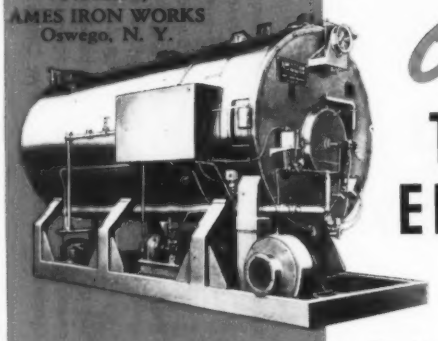
The **Chain Belt Company,** Milwaukee, Wis., has announced the appointment of **Charles Pingry** as district sales engineer with headquarters at Dallas, Tex.

**Richard N. Chapin** has been appointed general purchasing agent of the **Air Reduction Sales Company,** to succeed **Walter R. Clark,** who resigned to become head of the purchasing department of **U. S. Industrial Chemicals, Inc.**

The **Portland Cement Association** district offices in Dallas, Tex., and Austin, have been consolidated into a single district office in the latter city, and **James D. Piper,** formerly the association's district highway engineer at Dallas, has been appointed district engineer in charge of all work in Texas.


AMESTEAM GENERATOR
"The Railroad Boiler"

Product of
AMES IRON WORKS
Oswego, N. Y.



Over 80%
THERMAL EFFICIENCY

Check These Advantages

- 80% Thermal Efficiency
- 100% automatic
- Abolishes boiler room labor
- Uses oil or gas fuel or a combination of both
- No smoke—no soot
- Takes up 1/3 the space of conventional boilers
- Suitable for multiple installations
- Delivered complete ready for service connections

Trouble-free, 100% automatic in operation, the AMESTEAM GENERATOR requires no chimney draft, only a simple vent to the atmosphere. Here is compact steam efficiency at its best. This unit takes up only one-third the space required by the conventional boiler. Important savings include elimination of boiler room labor and the fuel-saving advantages of a thermal efficiency of over 80%.

Ideal for low-pressure heat in station or shop, also for high pressure work for sand drying, Diesel de-icing and a host of other railroad applications.

Single units from 10 to 400 H.P. Suitable for multiple installations. Design pressure —15 to 200 lbs. Higher pressures on order.

See what this modern boiler can do for you. *Phone, write or wire.*

*Exclusive Distributors to the Railroads*
**RAILROAD SUPPLY and EQUIPMENT, INC.**
*First Federal Building*
148 ADAMS AVE., SCRANTON 3, PA.
*Phone Scranton 7-3391*

**J. D. Greensward** has been appointed general manager of the Norwood (Ohio) works of the **Allis-Chalmers Manufacturing Company.**

**John E. Carroll** has been appointed general sales manager of the **American Hoist & Derrick Company,** St. Paul, Minn. Mr. Carroll was graduated in

**John E. Carroll**

engineering from the University of Minnesota and joined American Hoist in 1937 as a district sales representative, covering the Texas, Chicago and West Coast territories, successively.

**Fred C. Schultze,** formerly assistant sales manager of the **Waukesha Motor Company,** Waukesha, Wis., has been appointed sales manager. Mr. Schultze joined the company in 1928 and was active in various departments, including purchasing and plant engineering, before he joined the sales department.

The **Homelite Corporation,** Port Chester, N.Y., has announced the opening of a new branch office in Pittsburgh, Pa., to cover western Pennsylvania, West Virginia and eastern Ohio. **William Livingston** will be in charge of the new office, located at 810 Ridge avenue. Mr. Livingston's employment with Homelite dates back to 1940, with a two-year interruption during the war when he served as a lieutenant in the U. S. Army Air Force. Since the war, he has been a salesman for Homelite in the eastern Pennsylvania area, with headquarters at Reading, Pa.

The new Pittsburgh office will carry a complete stock of Homelite carryable pumps, generators, blowers, chain saws, electric paving breakers and floodlights.

(*Please turn to page* 708)

On the road, for example, it's as easy to drive as any ordinary truck. On the job, its control makes a hit with operators. MICHIGAN'S air ram clutches are fast and smooth . . . they take the work out of operating. My operators *like* those finger-tip air controls—and *I* know that they've paid off in faster, more efficient operation . . .

And then there's MICHIGAN'S *remote control.* When you pull onto the job, you're ready to go! There are no draglinks to disconnect, no adjustments to make. You can drive and steer from the turntable cab with the cab in any position. The turntable engine supplies the power.

Take all these easy-handling advantages together and you can see why I advise you to get a MICHIGAN!"

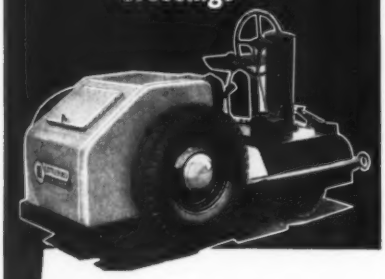
***Write for Bulletin 100—***
***"On the Job with MICHIGAN"***

DID YOU KNOW
you can buy
a brand new
**MICHIGAN**
**TRUCK CRANE**
complete with chassis
for as little as $10,250
F.O.B. factory?

**MICHIGAN**

**MICHIGAN POWER SHOVEL COMPANY**
**400 Second Street, Benton Harbor, Michigan, U.S.A.**

RAILWAY MAINTENANCE CREWMEN USE
the LITTLEFORD TRAIL-O-ROLLER
for Permanent Crossings



This small, compact, portable Trail-O-Roller makes blacktop crossings, parking areas, station platforms smooth permanent surfaces. The Trail-O-Roller can roll dozens of jobs in a single day—it travels as fast as the maintenance truck can go, yet it takes only 2 minutes to change it from the trailing to rolling position. And too, the compaction is as great as any 5 ton tandem roller.

If you're looking for a time and labor saving unit this Trail-O-Roller will give you the low cost way for doing permanent blacktop maintenance work. Many railroads are using the Trail-O-Roller today to save labor costs—you too can save with a Trail-O-Roller. Write for Bulletin No. 3.

Trail-O-Roller trails behind any maintenance truck.

LITTLEFORD
LITTLEFORD BROS., INC.
471 E. Pearl St., Cincinnati 2, Ohio

## Supply Trade News (Cont'd)

**Max K. Ruppert,** president of the **P. & M. Co.,** with headquarters at Chicago, whose election also as vice-president of **Poor & Co.** was reported in the

**Max K. Ruppert**

June issue, was born at Grand Rapids, Mich., on June 5, 1899. He was graduated from the New Mexico Military Institute at Roswell, N.M., and before joining the P. & M. Co. served on the Chicago, Rock Island & Pacific as chainman, rodman, ballast inspector and rail inspector. In 1924 he was appointed foundry inspector for the P. & M. Co., and later held the positions, successively, of service engineer, salesman, assistant eastern manager and vice-president. Mr. Ruppert was elected president of the company in 1943.

**E. A. Condit,** president of **The Rail Joint Company,** New York, whose election also as vice-president of **Poor & Co.,** Chicago, was reported in the June issue of *Railway Engineering and Maintenance*, was born at Hoboken, N.J., on September 17, 1880, and was graduated from Stevens Institute of Technology in 1902. He began his business career with the Rail Joint Company as a draftsman and later served as inspector of raw material and finished products and as chief inspector at the Troy mill. During the St. Louis Exposition, he installed and took charge of the company's exhibit, and in 1905 became inspector at Pittsburgh, Pa. The following year he opened a sales office at Pittsburgh, where he remained until his promotion to sales manager at New York in 1918. He became vice-president in 1926 and was elected president in 1943. Mr. Condit has also served as a director since 1929 and as vice-president of the Rail Joint Company of Canada since 1926.

The **Caterpillar Tractor Company,** Peoria, Ill., has announced a realinement and expansion of its general sales department, and expansion of its advertising department, involving the following changes: **H. H. Howard,** general sales manager, as director of sales; **J. J. Valentine,** assistant general sales manager, and **J. H. Mohler,** manager, sales training division, as assistant sales directors; **K. F. Ames,** assistant manager, Central sales division, as successor to Mr. Mohler; **C. K. McClelland,** district representative, Central division, as assistant Eastern division sales manager, succeeding **W. N. Foster,** appointed manager of the new sales engineering division; **L. J. Deyo,** assistant to assistant general sales manager, as head of the market research group; **J. M. Abbey,** district representative, Central division, as successor to Mr. Ames; **George E. Wennerlyn,** as assistant to advertising manager, and **Burt Powell,** manager of publicity and sales publications divisions, as assistant advertising manager.

**Gilfry Ward** has been appointed vice-president in charge of sales of the American manganese steel division of the **American Brake Shoe Company,** with headquarters at Chicago Heights, Ill. Mr. Ward has been with Brake Shoe since he was graduated from Yale Uni-

**Gilfry Ward**

versity in 1928, and has spent many years on both the east and west coasts with its sales organization.

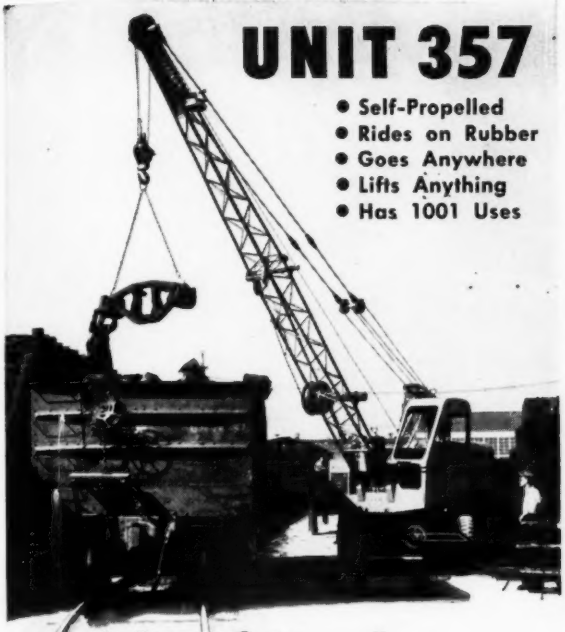
The **Whiting Corporation,** Harvey, Ill., and Los Angeles, Cal., has announced the appointments of the following distributors: The **George E. Miller Company,** 24 Brighton avenue, Boston 34, Mass.; the **Grays Metal Works,** 50th street and Grays avenue, Philadelphia 43, Pa., and the **James J. Burke Company,** 405 Kearns building, Salt Lake city 1, Utah.

The **Athey Products Corporation,** Chicago, has appointed **Reid Evans** as its district representative for the north central area, with headquarters at Urbana, Ill., and **Marvin B Stanley** as sales and service representative for the southwest territory, with headquarters at San Leandro, Cal. Mr. Evans was formerly branch manager of the Ohio Machinery company at Toledo, Ohio, and Mr. Stanley was formerly service representative for Athey on the Pacific Coast.

(*Please turn to page* 710)

# UNIT 357

- Self-Propelled
- Rides on Rubber
- Goes Anywhere
- Lifts Anything
- Has 1001 Uses



## Inside of Yard
## Outside of Yard
## On the Tracks
## Off the Tracks

**UNIT 357 handles easily...Works efficiently in close quarters.**

The ideal machine for right-of-way maintenance . . . railroad shops . . . or stores departments. Ready for action with a push of the starter. Cuts maintenance costs to rock bottom. Fully convertible. Gas or Diesel power. Ask for literature.

Operated by ONE man . . . Powered by ONE engine . . . Controlled from ONE position in UNIT's safety-promoting FULL VISION CAB.

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SHOVELS • DRAGLINES • CLAMSHELLS
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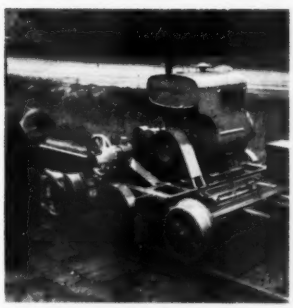
# The MAINLINES are The PROVING GROUNDS for WISCONSIN HEAVY-DUTY *Air-Cooled* ENGINES

Kershaw Kribbers, built by the Kershaw Co., Inc., Montgomery, Ala.

Electric Tamper & Equipment Co., Portable gas-electric power unit and tampers.



Northwestern combination motor car and frog and rail grinder, built by Northwestern Motor Co., Eau Claire, Wis.

Fairmont Grouting Machine, built by Fairmont Railway Motors, Inc., Fairmont, Minn.

Whether it's a Kershaw Kribber working on a mainline of the South, or a Fairmont Grouting Machine in operation in the Midwest, Wisconsin Heavy-Duty Air-Cooled Engines provide dependable, heavy-duty, low cost power.

And it's the same story regardless of the line you travel. Wherever maintenance crews are working, the chances are you'll also find Wisconsin-powered equipment bearing such names as Chain Belt Co., Electric Tamper & Equipment Co., Binks Mfg. Company, Chicago Pneumatic Tool Co., The Koehring Co., White Mfg. Co., Kalamazoo Mfg. Co., Woolery Machine Co., Northwestern Motor Co., Harnischfeger Corp., Wayer Impactor Sales Co., Fairmont Railway Motors, and the Kershaw Co. Inc. . . . all of them building one or more Wisconsin-powered units. These equipment builders rely on Wisconsin Engines because of such features as tapered roller bearings at *both* ends of the crankshaft . . . positive air-cooling in temperatures from sub-zero to 140°F . . . and quick starting and steady running in all weather because of an easily-serviced rotary type OUTSIDE magneto equipped with impulse coupling.

**Why not learn more about these dependable power units . . . WISCONSIN ENGINES . . . by writing us today? 2 to 30 hp., 4-cycle single, two-, and four-cylinder models.**

MOST H.P. HOURS

**WISCONSIN MOTOR CORPORATION**
*World's Largest Builders of Heavy-Duty Air-Cooled Engines*
MILWAUKEE 14, WISCONSIN

**Rail-Road Specialist**

*Only*

**Burro Cranes Have:**

- Fast travel speeds—up to 22 M.P.H.
- Draw Bar Pull of 7500 lbs. (often eliminates need for work train or locomotive).
- Elevated Boom Heels for working over high sided gondolas.
- Short tail swing—will not foul adjoining track.
- Low overall height—Burro can be loaded and worked on a standard flat car.

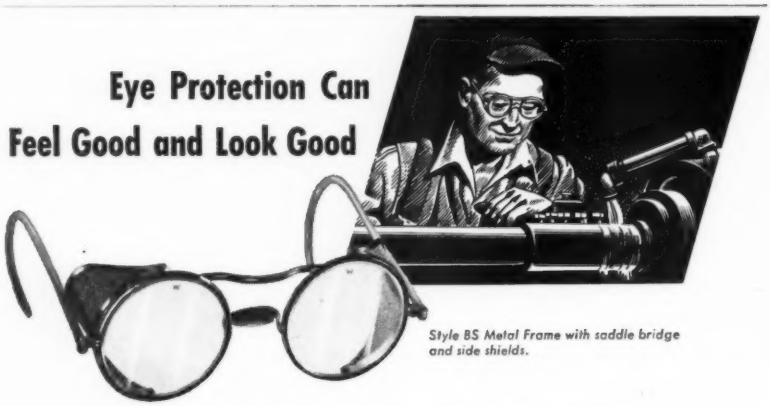
We call Burro Cranes "Railroad Specialists" because they do so many railroad jobs so well. Track work, bridge work, bulk materials handling, Mechanical Stores Department, material handling with or without magnet, are only a few jobs Burro does with speed and economy.

Burro Cranes are designed for railroad work—not adapted to it. Watch a Burro work and see why it's called on to do so many jobs by most of the country's railroads.

Burro WORK Power means more EARNING Power

**CULLEN-FRIESTEDT CO.**
1301 S. Kilbourn Ave., Chicago 23, Ill.

**Eye Protection Can Feel Good and Look Good**



*Style BS Metal Frame with saddle bridge and side shields.*

These safety spectacles with either metal or plastic frames feel good because they fit any type of face with that "made-to-order" look. Comfortable fit is assured by their light weight and the variety of bridge widths and lens sizes available. They are furnished with or without sideshields, and fitted with WILLSON Super-Tough*, flat or curved lenses for ample protection on many heavy-duty operations.

*Style A Metal Frame with rocker nose pads.*

*For complete information on these products and their application, as well as many more eye and respiratory protective devices, get in touch with your nearest WILLSON distributor or write us direct.*

*Styles W P and W P S Plastic Frames with and without sideshields.*

WILLSON*

*T. M. Reg. U. S. Pat. Off.

**WILLSON PRODUCTS, INC., 243 WASHINGTON ST., READING, PA.**


## Trade Publications

*(To obtain copies of any of the publications mentioned in this column, use postcards, page 655)*

**"Cat" Motor Graders Do the Job**—The Caterpillar Tractor Company has published a 16-page booklet featuring the adaptability of motor graders to year-around maintenance work. It presents performance records of various models and illustrates their applications in precision ditching, bank shaping, terracing, snow removal and general maintenance work.

**Longer Life for Crossties**—This is the title of an eight-page illustrated bulletin, published by the F. Burkart Manufacturing Company, describing the features of the Burkart tie pad for prolonging the life of crossties by reducing the abrasive action of the tie plates. The bulletin contains photographs demonstrating the effectiveness of the pads and gives information on their properties and characteristics.

**Measurement of Water Flow Through Pipe Orifice with Free Discharge**—This is the title of a 40-page booklet revised and re-issued by Layne & Bowler, Inc. It explains the Layne Pipe Orifice Meter method of computing water flow, telling how to use it and how accurate it is, and gives flow graphs for pipes of various sizes.

**Semaphores Up with International Off-Track Power**—This is the title of an eight-page, two-color pamphlet issued by the Industrial Power Division of International Harvester Company, which describes and illustrates railroad applications of International wheel and crawler tractors.

**Aluminum Structural Design**—This is the name of a 124-page handbook, published by the Reynolds Metals Company, on the design of load-carrying aluminum structures. The purpose of the book is to enable the engineer familiar with mechanics of materials to design an original structure of aluminum, or to convert an existing structural design from some other material to aluminum.

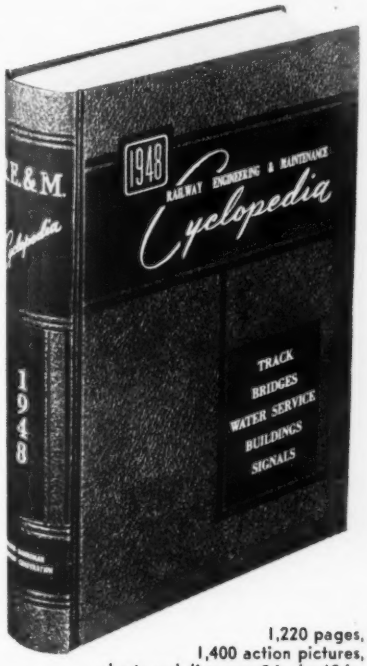
**Welding Accessories**—The Air Reduction Sales Company has published a 15-page illustrated catalog of welding accessories. It covers items for both oxyacetylene and electric-arc welding, including goggles, hose, sparklighters, gloves, electrode holders, cable, weld-cleaning tools, face shields and many others.

**Monel Roofing Data**—The International Nickel Company, Inc., New York, has published a four-page bulletin entitled, Basic Application Data, outlining the characteristics of Monel roofing sheet, giving general rules for its installations and telling how to word specifications for Monel roofing. One page of the bulletin is given over to a table of suggested gages of Monel roofing sheet for principal building applications.

# IF YOU ARE ONE OF THE LUCKY 5,000 . . . . THIS MESSAGE IS NOT FOR YOU

YES, more than 5,000 railway men already have "snapped up" copies of the New Railway Engineering & Maintenance Cyclopedia. It is the most complete book ever printed on the construction and maintenance of Track, Signaling, Bridges, Buildings and Water Service. Really it is six great books in one handy, reference volume containing full descriptions of the newest power and hand tools, work equipment, devices, appliances and materials. Included are the latest specifications of the American Railway Engineering Association and Signal Section A.A.R.; also complete easy-to-read descriptions of practical and efficient methods of doing hundreds of different maintenance jobs.

Here within two covers are the latest detail data that otherwise are scattered through hundreds of books and thousands of magazines and pamphlets. Prepared by a staff of practical railway specialists, the New Cyclopedia is the only guide of its kind for all practical railway men that want the latest and the best book on maintenance of way.




1,220 pages, 1,400 action pictures, charts and diagrams 9 in. by 12 in. bound in rich maroon Fabrikoid and stamped in gold.

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The best way to judge a reference book of this kind is from what the buyers say and we've received hundreds of enthusiastic replies from all over the globe. A busy Engineer Maintenance of Way says: "I refer to the Cyclopedia almost daily and seldom have a conversation with any of my roadmasters without referring to it."

A Supervisor sums it up this way: "The Cyclopedia is the only book of its kind containing information in a condensed, practical form that is an everyday working tool."

## *OFFICIALLY OK'd*

Advisory committees appointed by the American Railway Engineering Association and the Signal Section of the Association of American Railroads cooperated with our editorial staff in revamping the New Cyclopedia. Hence the book comes to you with the endorsement of both associations. This cooperation also has made it possible to quote freely the specifications and recommendations that are most used by men in the field.

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From Canada to Mexico and coast to coast orders are pouring in for the New Cyclopedia. Already three-quarters of the new edition has been sold. More than 800 copies have gone to men on the Southern and the New York Central Lines (about same number to each road); more than 150 to the Reading, 407 to the Burlington, incomplete returns from the Canadian National 175, Northern Pacific 192, Erie 237; Milwaukee 176, Illinois Central 161, Norfolk & Western 109, Santa Fe 227, just to mention a few.

Just a word to the wise: the last edition sold out at the same rate and we were forced to disappoint 2,200 railway men by returning their orders after our supply of books was exhausted. $8.00 per copy post paid. Write for attractive discounts in lots of 6 or more.

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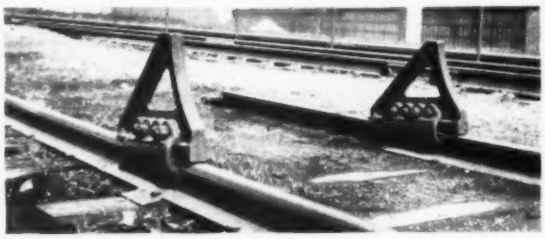
Recently, the Chief Engineer of a prominent Western Railway declared: "If young engineers would take time to study the Cyclopedia they would be much better informed."

## SAVE TRACK SPACE with Q & C CAR STOPS



Q & C Car Stops are economical because they require very little track space and a minimum of labor for application. They wedge firmly to the rails. No drilling is necessary. One size is suitable for all sections of rail used in yards and side tracks.

*Order now for early delivery*

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MODEL 540 A MallDrill

Use it for heavy-duty drilling of holes up to 1¼" in steel, 1½" in masonry, 2½" in wood, driving lag screws and nut running. Has universal motor with 150 r.p.m. free speed, for 115-volt AC-DC, also model for 230-volts, reversing switch and triple gear reduction. Equipped with Timken roller bearings. Die cast magnesium alloy housings. Slip clutch, ⅜" Jacobs chuck, socket wrench and side handle are optional equipment.

*Write at once for literature, prices and a FREE Demonstration on your Right of Way.*

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*Railroad Division*

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## A "10 TON ROLLER" THAT PAVES FLUSH TO RAILS

Heated Plate Hits 2000 Blows a Minute of 700 Lbs. Impact. Gives greater density than a big roller.

One man, with 230 lb. machine, super-tamps, finishes and cures 60 to 80 sq. ft. of patching in one minute — right up to rails or cushion strip — any hot or cold bituminous material, winter or summer. Ask for Bulletin 25-8 and name of distributor who will demonstrate.

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You can fill out your set of bound volumes of Railway Engineering and Maintenance from extra copies in our Cleveland and New York offices:

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***Excellent bindings. $3.00 each, fob.***

We also have broken sets of Railway Age, Railway Mechanical Engineer, and Railway Signaling. A list will be sent on request.

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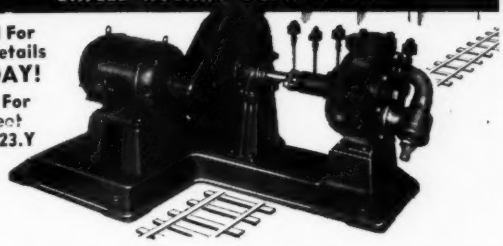
**FULFILLS THE NEED FOR A TOTALLY ENCLOSED 200 G.P.M. SINGLE ROTARY PUMP UNIT!**

**Send For Full Details TODAY!**
**Ask For Sheet SP-223.Y**



For fast loading and unloading of gasoline, fuel oil or Diesel fuel, the Viking model Q162 is the answer. Ideal for installing out of doors without a pump house. Reduce your unloading time with this big rugged unit. Built to take it.

**OUTSTANDING FEATURES**

1. A 200 gpm at 375 rpm size Viking pump.
2. New oil-tight, cast iron gear case. No leakage.
3. Radial bearing for pump shaft.
4. Stainless steel pump shaft. No rusting.
5. Viking valve on pump head. (Optional.)
6. Extra long stuffing box on pump.
7. New rugged, base and motor rails. Built to accept up to 15 H.P. motor.
8. Five ball check grease cups. (Other style grease fittings optional.)
9. Complete unit totally enclosed for outside use without protection of any kind.

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AN HONORED NAME IN PUMPING

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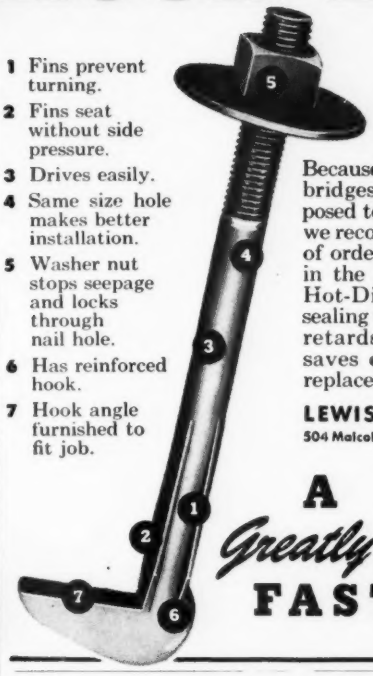
Cedar Falls, Iowa

# SEALTITE HOOK BOLT




1. Fins prevent turning.
2. Fins seat without side pressure.
3. Drives easily.
4. Same size hole makes better installation.
5. Washer nut stops seepage and locks through nail hole.
6. Has reinforced hook.
7. Hook angle furnished to fit job.

***Double Life* SEALTITE HOOK BOLTS**

Because railroad trestles and bridges are constantly exposed to corrosive conditions we recommend the economy of ordering your hook bolts in the Sealtite Double-Life Hot-Dip galvanized finish sealing the bolt in zinc which retards all corrosion and saves expense of frequent replacement.

**LEWIS BOLT & NUT CO.**
504 Malcolm Ave. S.E., Minneapolis, Minn.

**A *Greatly Improved* FASTENER**

REPLACE WITH
# BARBER-GREENE
## BELT CARRIERS

Many hard-used belt conveyors are causing excessive belt wear, consuming unnecessary power and are otherwise a source of trouble due to worn-out belt carriers. Now is the time to check yours and, at small cost, replace with new Timken or ball bearing-equipped Barber-Greene Carriers. A full range of sizes and types immediately available, featuring all-welded construction, interchangeable rollers with internal grease reservoir in each roller. See your B-G distributor or write:

**Barber-Greene Company**
Aurora, Illinois

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## COOL, PURE DRINKING WATER WHEREVER THEIR JOBS TAKE THEM

**DOBBINS Portable Sanitary Drinking Fountain**

Assures an adequate supply of cool, pure drinking water for maintenance crews, section hands, locomotive engineers. Protects their health and keeps them on the job. Fountain has inner water container of stainless steel. Four gallon tank is fully insulated. Constant air pressure for instant flow of water is furnished by a few strokes of the pump at widely spaced intervals. Operates *at the press of a button*, like any bubbler drinking fountain. May be carried easily from place to place by shoulder strap, or mounted on truck, tractor or locomotive. Prices on request.

**DOBBINS MANUFACTURING CO.**
Dept. 720, Elkhart, Indiana

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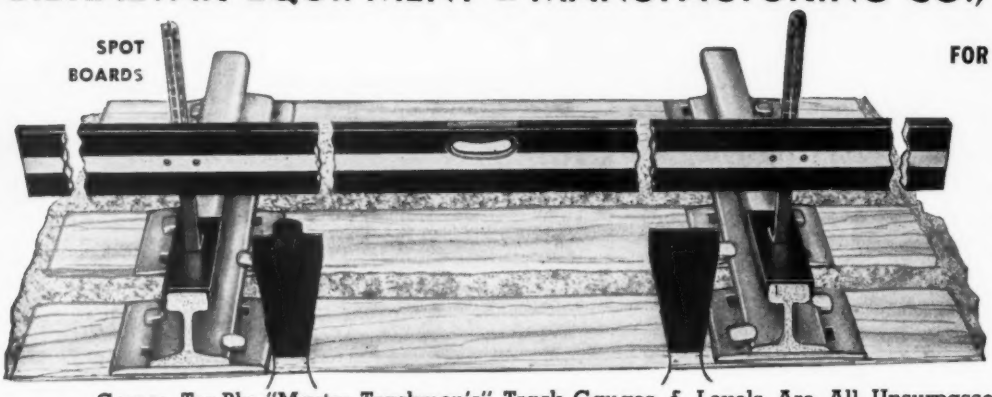
*Free* FOLDER

Dobbins Superbilt
PORTABLE DRINKING FOUNTAIN

"GEMCO TRU-BLU TOOLS". BEST TRACK TOOLS FOR TOP TONNAGE TRANSPORTATION! MADE BY:

GIBRALTAR EQUIPMENT & MANUFACTURING CO., ALTON, ILL.

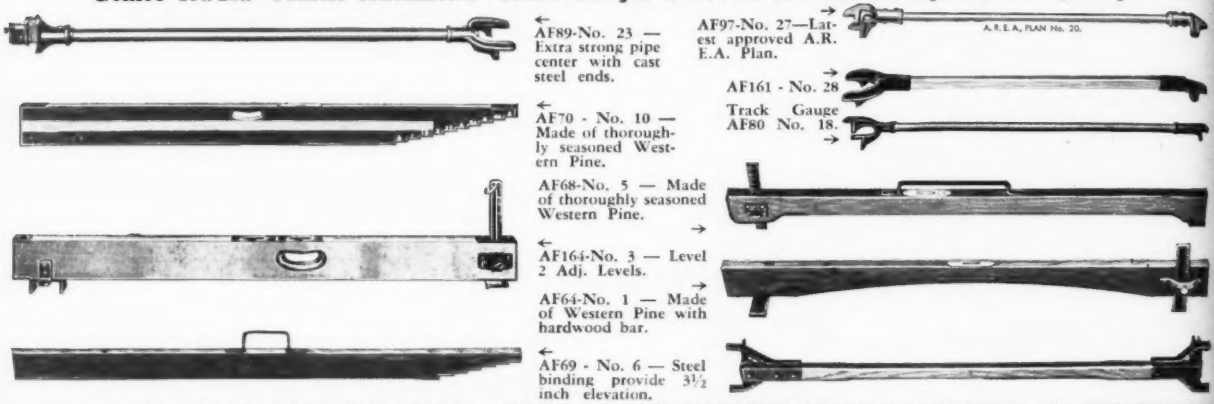
SPOT BOARDS



HEADQUARTERS FOR GEMCO TRU-BLU

"MASTER TRACKMEN'S" TRACK TOOLS MADE TO YOUR OWN PLANS. ALSO ALL STANDARD ITEMS — CAR MOVERS, GAUGES, BENDERS, RAIL CARS, LEVELS, TIE TONGS, RAIL DRILLS, CAR-STOPS, DERAILS, LEVELERS, GREASE GUNS, ETC.

Gemco Tru-Blu "Master Trackmen's" Track Gauges & Levels Are All Unsurpassed in Quality!

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AF97-No. 27—Latest approved A.R.E.A. Plan.

AF161 - No. 28 Track Gauge AF80 No. 18.

AF70 - No. 10 — Made of thoroughly seasoned Western Pine.

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AF64-No. 1 — Made of Western Pine with hardwood bar.

AF69 - No. 6 — Steel binding provide 3½ inch elevation.

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# ALPHABETICAL INDEX TO ADVERTISERS, JULY, 1949


**A**

American Brake Shoe Company ..... 664
American Fork and Hoe Company, The ..... 626
American Hoist and Derrick Company ..... 652
Armco Drainage & Metal Products, Inc. ..... 637

**B**

Barber-Greene Company ..... 713
Barco Manufacturing Co. ..... 653
Beall Tool Division, Hubbard & Co. ..... 705
Benbow Fence Tightener Co. ..... 641
Bethlehem Steel Company ..... 623
Bird & Son, Inc. ..... 638

**C**

Caterpillar Tractor Co. ..... 649
Chicago Pneumatic Tool Company ..... 624
Cullen-Friestedt Co. ..... 710

**D**

Dearborn Chemical Company ..... 645
Dobbins Manufacturing Co. ..... 713
Duff-Norton Manufacturing Co., The ..... 628

**E**

Eaton Manufacturing Company ..... 622
Electric Tamper & Equipment Co. ..... 634-635

**F**

Fabrecka Products Company, Inc. ..... 695
Fairbanks, Morse & Co. ..... 640
Fairmont Railway Motors, Inc. ..... 662
Flintkote Company, The ..... 647

**G**

Gibraltar Equipment & Manufacturing Co. ..... 714

**H**

Homelite Corporation ..... 630
Hubbard & Company ..... 650-705

**I**

Industrial Brownhoist Corporation ..... 629
Ingersoll-Rand Company ..... 627
Inland Steel Co. ..... 703
International Harvester Company ..... 643

**J**

Johns-Manville ..... 654

**K**

Koppers Company, Inc. ..... 642

**L**

Lewis Bolt & Nut Co. ..... 713
Littleford Bros., Inc. ..... 708
Lufkin Rule Co., The ..... 646

**M**

Mall Tool Company ..... 712
McCulloch Motors Corporation ..... 633
Michigan Power Shovel Company ..... 707

**N**

National Lock Washer Company, The ..... 715
Nordberg Mfg. Co. ..... 659
Northwest Engineering Company ..... 625

**O**

Oliver Iron and Steel Corporation ..... 700

**P**

P. & M. Co., The ..... 621
Pittsburgh Pipe Cleaner Co. ..... 702
Pittsburgh Plate Glass Company ..... 651
Power Ballaster Division ..... 638-639
Pullman-Standard Car Manufacturing Company ..... 638-639

**Q**

Q and C Co., The ..... 712

**R**

Racine Tool and Machine Co. ..... 648
Railroad Accessories Corporation ..... 661
Railroad Supply and Equipment, Inc. ..... 706
Rails Company, The ..... 657
Railway Track-work Co. ..... 705
Ramapo Ajax Division ..... 664
Reade Manufacturing Company, Inc. ..... 699

**S**

Schramm Inc. ..... 697
Simmons-Boardman Publishing Corporation 711-712

**T**

Templeton, Kenly and Company ..... 704
Texas Company, The ..... 716
Thew Shovel Company, The ..... 632
Timken Roller Bearing Company, The ..... 631

**U**

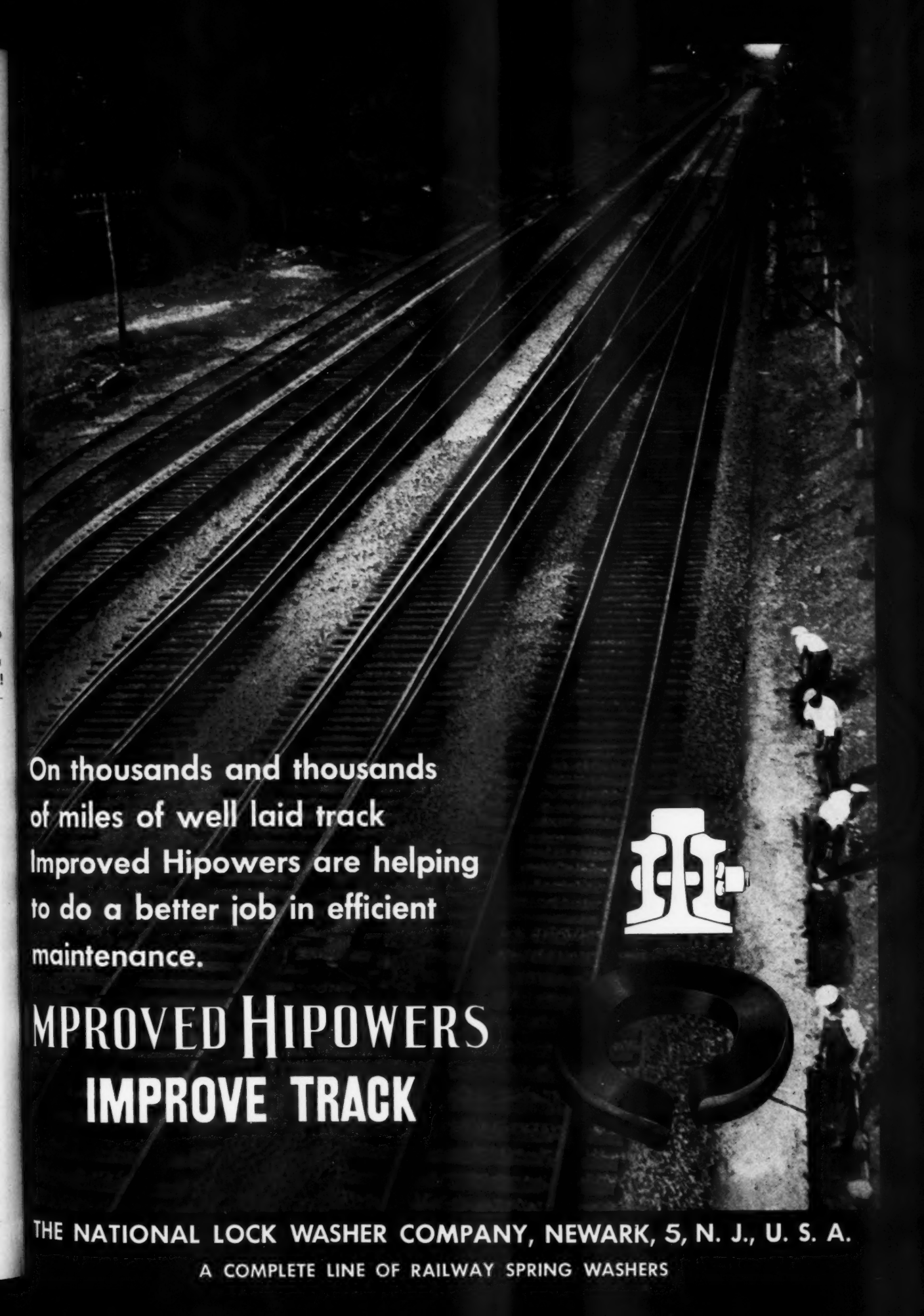
Union Metal Manufacturing Company, The ..... 644
Unit Crane & Shovel Corp. ..... 709

**V**

Viking Pump Company ..... 713

**W**

Warner & Swasey ..... 701
Wayer Impactor Sales Company ..... 712
Willson Products, Inc. ..... 710
Wisconsin Motor Corporation ..... 709
Woodings Forge and Tool Co. ..... 693
Woolery Machine Company ..... 636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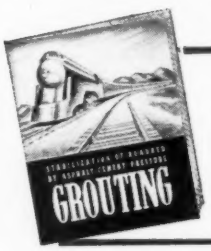


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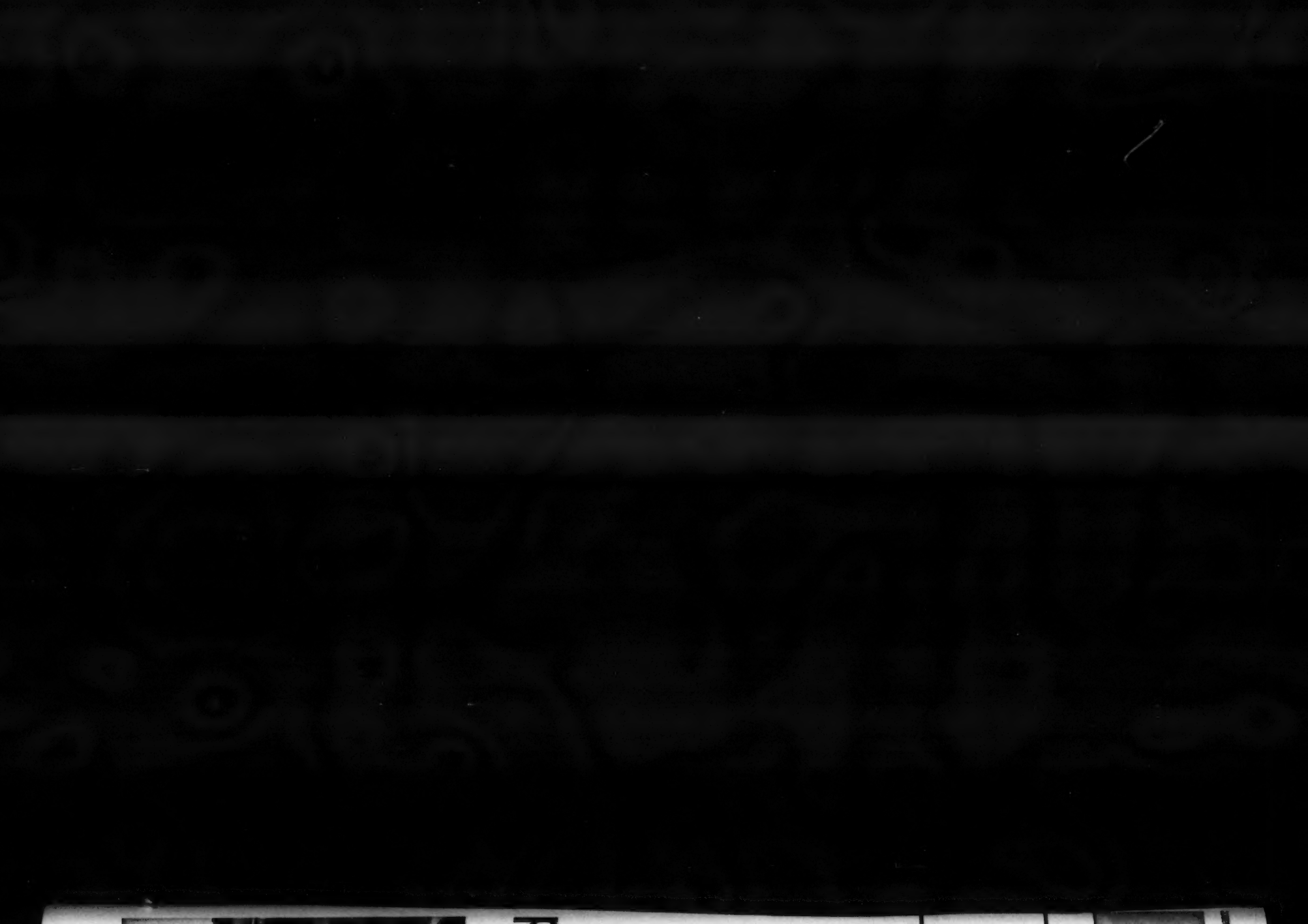
*For additional information, use postcard, pages 655-656*